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## Educational change and ICT: an exploration of priorities 2 & 3 of the DfES eStrategy in schools and colleges

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# Educational change and ICT:

an exploration of Priorities 2 and 3 of the  
DfES e-strategy in schools and colleges

The current landscape and implementation issues

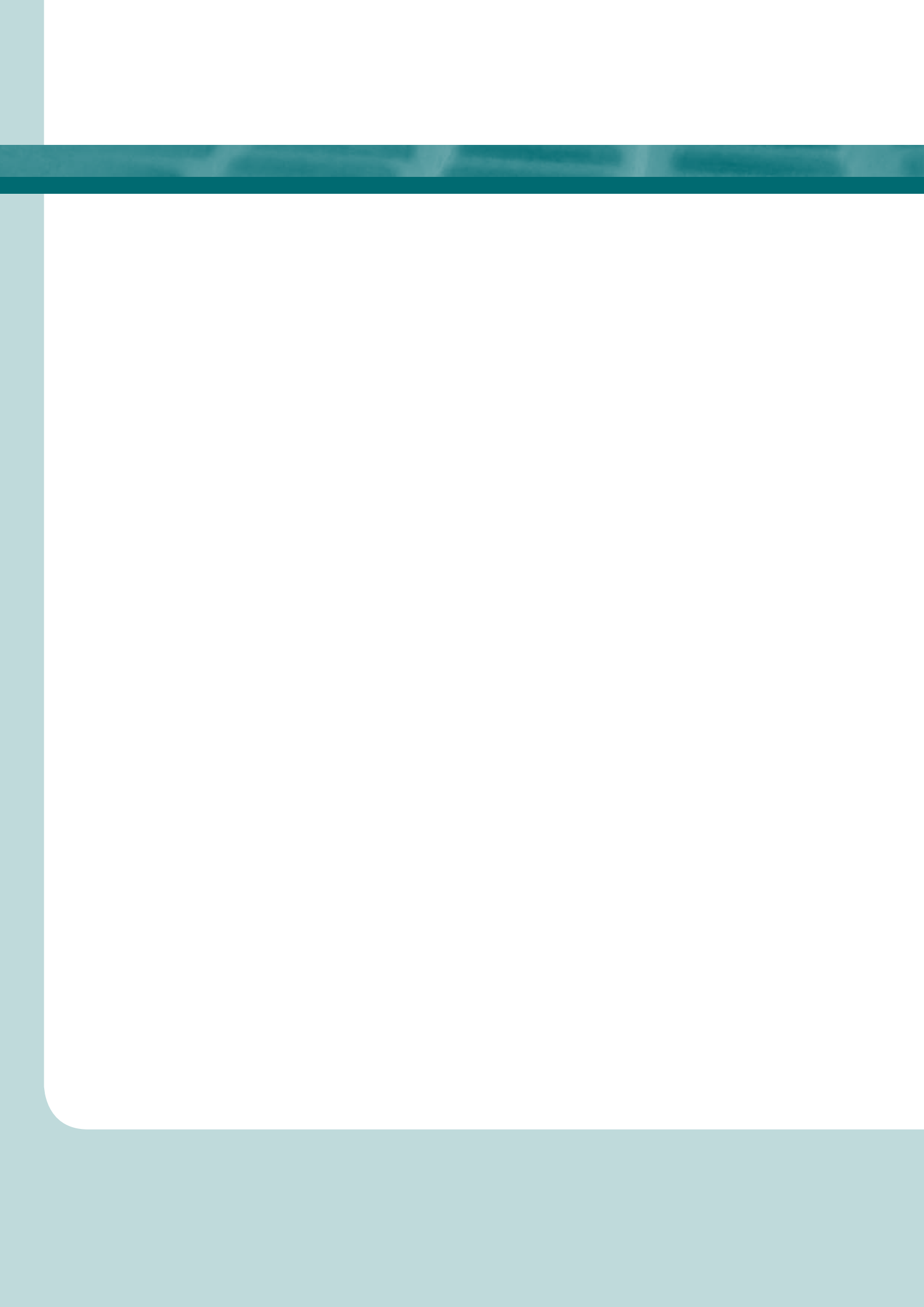
Peter Twining, Roger Broadie, Deirdre Cook, Karen Ford,  
David Morris, Alison Twiner and Jean Underwood





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# Executive Summary

## Introduction

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In mid-2005 Becta commissioned the Open University to lead a review of Priorities 2 and 3 of the DfES e-strategy. The e-Strategy Implementation Review (eSIR) set out to identify the existing technologies and approaches being implemented and to note future development and research needs.

Priorities 2 and 3 of the e-strategy focus primarily on the provision of integrated online personal support for learners and, by harnessing the full potential of new technologies, transforming how people learn.

The eSIR focused specifically on schools and colleges of further education (FE), but drew on evidence relating to other sectors where this was feasible and relevant. At the onset of the project the vision implicit in the e-strategy was made explicit in the 'eSIR reference statement' shown in [Table 6](#) (p14) ([Appendix 1](#) gives a more detailed account). The eSIR reference statement was mapped onto the core ICT functionality required in order to deliver Priorities 2 and 3 of the e-strategy. Data on current practice was collected through an online questionnaire and over 60 extended telephone interviews. The informants were atypical of the education community as a whole, in that they were all knowledgeable about the use of ICT in education, based on their practical and often strategic roles in implementing its use in local authorities (LAs) and/or colleges. The data collected was analysed alongside evidence from the literature (for more details see p15 [Methodology](#)).

This report outlines findings from the review process and identifies areas where further research and development are needed.

- 'The findings' section of the report focuses on the 'solutions' being implemented in support of Priorities 2 and 3 of the DfES e-strategy.
- The 'key implementation issues' section of the report focuses primarily on the vital importance of 'management of change' issues in relation to the implementation of the DfES e-strategy.

While many of these implementation issues are not 'new', the fact that the evidence collected as part of this review clearly indicates that they are still the most important factors affecting the implementation of ICT in education is itself significant.

## The DfES e-strategy

The six priorities in the DfES e-strategy (2005) are summarised in [Table 2](#) (p9). Priorities 2 and 3, which are the focus of this report, relate to the provision of integrated online support for children and learners and a collaborative approach to personalised learning (see p10 [Overview of Priority 2](#) and p11 [Overview of Priority 3](#) for more details). The DfES further refined the e-strategy by overlaying its six priorities with four broad themes:

- A learner-centric knowledge architecture
- Personalised content
- Strategic technologies
- E-maturity  
(for more details see p12 [Four overarching themes](#)).

## Complexity and human factors

The review's focus was on the 'technological solutions' in the schools and FE sectors in relation to Priorities 2 and 3. However, it quickly became clear that the complexity of the changes that were needed in order to implement the relevant ICT functionalities effectively were such that respondents' prime concerns were with the change-management issues associated with implementation. Almost invariably these implementation issues related to 'human factors'. These are explored in the '[key implementation issues](#)' section of the report under the following headings:

- Complexity, change and the e-strategy (p66)
- Focus on people (p70)
- Buy-in (p74)
- Leadership (p77)
- Support (p79)
- Shared understandings (p82)
- Procurement (p86).

## Evidence of impact

There was little empirical evidence in the interview data of the impact of ICT on learning outcomes, a finding which reflects the current research literature. Reasons for this include the time scales needed for any impacts to become 'measurable' and the mismatch between the methods being used to determine impacts and the changes that ICT facilitates.

Try not to talk about ICT. Focus on educational priorities. Be involved with all people who are helping schools develop. Technology has to follow educational priorities – if it works the other way round, it is only by extreme good luck.

Interview, Ex38 – CLC

## Illustrative examples

A range of technologies and approaches were evident in our sample institutions (see [Table 1](#)). While these are illustrative, they are a partial view of the issues and approaches being implemented, and do not do justice to the complexities involved in embedding ICT effectively. They may thus provide an incomplete view of possibilities, and should be seen in relation to [the key implementation issues](#) (p65).

## Learning platforms and management information systems

Most of the 125 organisations responding to the web questionnaire were implementing learning platforms

(86%) and management information systems (MISs) (83%). Lack of MIS/learning platform integration was the norm, and was seen as problematic by respondents. The level of use of learning platforms varied considerably and was at best patchy, though clearly increasing. Where learning platforms were being used, this use was predominantly for staff and/or students to access digital resources. There was limited evidence of the use of email or other forms of electronic communication facilities by students in schools or colleges.

It seems likely that demand for bandwidth will increase as schools and colleges start to make greater use of learning platforms and multimedia applications. At present a significant minority of schools either do not have broadband or have lower-specification

**Table 1** Summary of examples of issues and approaches

Example	Focus	Technologies	Phase
1 (p25)	Introducing a VLE to school	VLE	Pre-16
2 (p25)	Supporting staff use of a VLE in an FE college	VLE	Post-16
3 (p33)	Using a website and online questionnaire to facilitate transfer between schools	'Interactive' website	Pre-16
4 (p33)	Collaboration between a college and local schools	VLE	Pre-16 + Post-16
5 (p34)	Collaboration between an FE college and (small) employers	Website	Post-16
6 (p39)	Developing a collaborative learning community	VLE	Pre-16
7 (p41)	Using assistive technologies to provide access to learning	Laptops + assistive technologies	Pre-16 + Post-16 (Special)
8 (p45)	PDA's for all	PDA's	Pre-16
9 (p55)	Using an e-portfolio system to enhance assessment of ICT across Key Stages 2 and 3	E-portfolios	Pre-16
10 (p55)	Using e-portfolios to enhance assessment in FE	E-portfolios	Pre-16 + Post-16
11 (p59)	Providing access to diverse commercial resources via a single portal	Web portal	Pre-16
12 (p60)	Collaborative teams developing digital resources at a regional level	Digital resources	Pre-16
13 (p63)	Using PDA's to open up access to learning	PDA's	Post-16



broadband connections (2Mbps, for instance) where the bandwidth does not meet their needs.

For more details see [Learning platforms](#) (p20), [Management information systems](#) (p29), and [Learning platform/MIS integration](#) (p31).

## Collaboration

While cross-sector working is high on the e-strategy agenda and this is reflected in the activity taking place in LAs, such work is still at a very early stage. There was limited evidence of collaboration between phases of education in our data, though this contrasts with some of the evidence from the literature about collaboration between FE colleges and schools. Notwithstanding this, it seems likely that different phases of education have different needs – especially in relation to learning platforms and other ICT facilities.

There appears to be a mismatch between the importance that the e-strategy places on parents and home-school links and the initiatives that are currently being implemented in schools and colleges to involve the home more in the educational process. While there are differences between the school and FE sectors in terms of the degree of involvement with employers and work-based learning, the e-strategy seemed to place a greater emphasis on involving employers than was evident from our data as a whole.

Lack of access to computing facilities, including internet access, continues to be a major issue, particularly for some sectors of the community. This inhibits home-school collaboration as well as reducing access to learning resources and support.

## Advice and support for learners

Traditional face-to-face forms of support were perceived as most important. However, there was an acceptance of a need to move to anytime/anywhere support for learners as envisaged in the e-strategy and reflected in the eSIR reference statement. Such support tended to be in the form of digital resources and tools that were accessible over the internet. At least 80% of the 125 respondents reported that ‘teaching’ and ‘supporting learners in taking responsibility for their own learning’ were vital.

## Support for assistive technologies

In the context of current legislation on disability discrimination, it is surprising that only 57% of respondents said that their organisations were implementing assistive technologies, with 27% saying that they had no intention of doing so.

## Mobile devices

Mobile devices have the potential to make a significant contribution to the implementation of the e-strategy. However, this potential is not currently being realised. This seems likely to be due in part to the fact that while different types of mobile device meet different educational circumstances, each of them suffers from a number of limitations.

## Extending the curriculum

The e-strategy emphasises the need to embed ICT across the curriculum and extend the curriculum to include a focus on the skills needed for the knowledge-based economy. The main thrust of developments reported in our data was towards cross-curricular ICT use. There was also strong agreement in our data and the literature in support of the need to revise the curriculum in order to place greater emphasis on core skills, including communication skills, learning to learn, critical thinking skills, information handling and problem solving. Such changes in curriculum require associated changes in pedagogy and assessment.

## New pedagogy

Respondents to the questionnaire saw enhancing pedagogy as one of their organisation’s most important aims. There was general agreement across the interviews that embedding ICT across the curriculum in order to enhance learning would require substantial changes to educational practices, along the lines indicated in the [eSIR reference statement](#) (Appendix 1 pi). However, such changes are very complex, are intimately linked with changes in curriculum and assessment, and will take a considerable amount of time to realise fully (see p66 [Key implementation issues: Complexity, change and the e-strategy](#)).



## New assessment (including e-portfolios)

E-assessment, including the use of e-portfolios, is at a very early stage in its implementation in most schools and colleges.

The interview data suggested that fewer than 30% of organisations either had e-portfolios or were in the process of implementing or experimenting with them. Where e-portfolios were in use, this tended to be in the context of assessing ICT competence.

## Digital resources

Access to useful resources is a key factor in driving uptake, but this is an area where there are major difficulties and much waste, as the balance between personally created content (which seems necessary to build 'ownership' of learning platform use) relative to content created by other educators or commercially has not yet been found. While Becta has started to explore the area of 'usefulness' and 'quality' through the Content Quality Framework<sup>1</sup>, further substantive work is needed.

## Opening up access

ICT has the potential to enhance learners' motivation and increase access to learning for 'hard-to-reach' groups. Some 96% of the questionnaire respondents identified motivating and engaging learners as one of the five most important aims within their organisation's vision, which ICT could support, and 64% said that inclusion was one of their organisation's top five aims. This reflected the data from the interviews, which suggested that for most organisations in our sample the focus was on embedding ICT effectively into 'mainstream' school and college activity.

## Key implementation issues

Analysis of the data from the web questionnaire and phone interviews clearly revealed a number of key issues that mapped well onto those emerging from the literature on 'educational' ICT. One strong message pervaded all of the interviews: the key to successful implementation of the e-strategy involves effective management of educational change, which

is primarily about people rather than the technology. The fact that many of these issues have been well documented over many years yet still remain as the key blockers to effective ICT use in education is significant.

## Complexity, change and the e-strategy

Implementing the e-strategy requires significant change in many aspects of teaching and learning. Such change takes a considerable time, particularly in the context of a complex, dynamic and inter-related system such as education.

## Focus on people

Although a robust technological infrastructure is a key factor in the implementation of the e-strategy, what is abundantly clear from our data is that the 'people' dimension is regarded as even more important.

## Support

It is essential for 'the technology' to enable users to do what they need to do at the time and place they are intending to use it. Effective support, in its various aspects, is vital to making this happen.

## Buy-in

In order to ensure the effective implementation of the e-strategy, it is essential to achieve buy-in by all those involved in education. Such buy-in needs to encompass both a shared vision for enhancing learning through the effective use of new technologies, and also agreement on the practical strategies required to implement that vision in practice.

## Leadership

Leadership is vital for the effective implementation of the e-strategy. Leaders were identified as playing a key role in developing shared visions, creating an ethos to support innovation and risk taking, ensuring effective use of resources, and co-ordinating activities – all of which are essential to enabling the transformation of education with the aid of ICT.

## Shared understandings

Shared understandings, visions and vocabularies are vital for the successful implementation of the e-strategy. However, such shared understandings are not easy to achieve.

## Procurement

Providing and supporting e-learning infrastructure is very expensive, and there is evidence that resources are being wasted. It is important to deploy effective procurement strategies to give the best value in whole-life cost-and-benefit terms. Procurement is a core facet of Priority 6 of the e-strategy and Becta has put in place frameworks and targets to help address some of these issues.

## Areas for further research and development

**The findings** (p19) and **Key implementation issues** (p65) identify specific areas in need of further research and development. These all relate to the overarching need to develop a shared vision of the education system in the 21st century and strategies for achieving that vision, based on an understanding of the impact of ICT on what is desirable and what is possible. We need to develop an integrated model for lifelong learning (and teaching) that is not only seen to be desirable and feasible, but also underpinned by an academic rationale and informed by evidence from research and practice.



# Exploring Priorities 2 and 3

## Overview of the project

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In July 2005 Becta commissioned the Open University to carry out a review of Priorities 2 and 3 of the DfES e-strategy. This report gives an overview of the project and presents an analysis of the current state of play in the schools and FE sectors in relation to Priorities 2 and 3, based on evidence from practice and the literature. The report goes on to identify future research and development needs.

### The DfES e-strategy – Priorities 2 and 3

#### Overview of DfES e-strategy

The DfES e-strategy, *Harnessing Technology*<sup>2</sup>, was launched in early 2005. It sets out six priorities for the implementation of ICT in educational and other related settings, which we summarise in Table 2.

The e-strategy includes specific actions and milestones to be met in relation to each of these six priorities (see p10 [Table 3](#) and p11 [Table 4](#) for details of these in relation to Priorities 2 and 3 respectively).

**Table 2** A summary of the six priorities<sup>3</sup>

<b>Priority 1</b>	<b>An integrated online information service for all citizens</b>
Building an integrated service of information, advice and guidance collected from all relevant organisations within education and children's services	
<b>Priority 2</b>	<b>Integrated online personal support for children and learners</b>
Aiming for online personalised support for learners, parents, and practitioners, giving secure access to personal records, online resources, tracking and assessment that works across all sectors, communities, and relevant public and private organisations	
<b>Priority 3</b>	<b>A collaborative approach to personalised learning activities</b>
Transforming how people learn by harnessing the full potential of new technology across all subjects and skill development, and embedding assessment more appropriately within learning and teaching	
<b>Priority 4</b>	<b>A good quality ICT training and support package for practitioners</b>
Defining a minimum level of ICT competence for teachers and other practitioners, promoting new ways of working, and of supporting parents, learners and employees, enabling all staff to become effective ICT users and innovators	
<b>Priority 5</b>	<b>A leadership and development package for organisational capability in ICT</b>
Helping leaders to assess how well their organisation uses ICT, and to adopt or share good practice, work with others, and plan their approach to ICT as part of their future strategy	
<b>Priority 6</b>	<b>A common digital infrastructure to support transformation and reform</b>
Developing high-speed access to robust and sustainable e-systems for all organisations across the sectors based upon a common systems framework and technical standards for the software and systems needed to support the strategy, and providing best value ICT procurement frameworks that are available to all organisations	

For us the intended impact is trying to change the way people work, and that takes time.

Interview 20 – LA

## Overview of Priority 2

Priority 2 focuses on providing a coherent and integrated support framework for children and learners across all sectors and phases of education.

It specifically identifies the key elements of this as:

- Cross-sector working in order to provide joined-up services
- Smooth transitions for learners within and between phases of education and between education and work
- Personal support and advice for lifelong learners.

A number of systems or technologies are seen as being essential to meeting these requirements. These include:

- A common framework for recording information about children and learners, which will enable data to be shared across and within sectors and phases of education, and between education and work (this will include a common qualifications framework)

- Online learning spaces, which provide secure access from wherever the learner might be to resources and tools for communicating and collaborating (such resources would include personal advice and support)
- E-portfolios, which provide facilities for learners to save their own work, collect material for assessment, maintain records of their achievements, and present selections of work for particular audiences
- Management information systems (MISs), which provide secure access over the internet for different 'actors' across different sectors and institutions, to timetables, records, assessment and tracking data
- Assistive technologies (ATs).

Table 3 summarises the specific actions and milestones for Priority 2.

**Table 3** The actions and associated milestones for Priority 2<sup>4</sup>

Priority 2 Ensure integrated online personal support for children and learners	
<b>Action</b>	Support children's and learners' transition and progression by developing and implementing a common approach to personal records across education and children's services, including public and private organisations and industry
<b>Milestones</b>	<ul style="list-style-type: none"> <li>• First phase of development of a unique learner number and learning data interface complete by 2006</li> <li>• Data-sharing framework and personal record format, including the specification for qualifications and credit data required for QCA's Framework for Achievement agreed for December 2005</li> <li>• Policy clarification across all education and work-based learning sectors by 2006</li> <li>• Recommendations from feasibility study on how to provide integrated e-portfolios by 2007</li> </ul>
<b>Action</b>	Encourage all organisations to support a personal online learning space for learners
<b>Milestones</b>	This requires sector-based actions and is covered in sections 10 to 13 [of the e-strategy].
<b>Action</b>	Promote a common approach to assessment across sectors to support personalised progression
<b>Milestones</b>	QCA working with LSC, e-Skills UK, and LSDA, through the Framework for Achievement, to agree strategy by January 2006
<b>Action</b>	Provide seamless support for assistive technologies for learners' and children's special needs
<b>Milestones</b>	Policy clarification across public services, to include continuity of support, by 2006

### Overview of Priority 3

Priority 3 focuses on transforming learning and teaching through the development of a collaborative approach to personalised learning activities. It specifically identifies the key elements of this as:

- Embedding technology (e-learning) across the curriculum
- Extending the curriculum, with a specific focus on 'information age' skills
- New forms of pedagogy, with a focus on flexibility and personalisation
- New forms of assessment, including a greater emphasis on 'assessment for learning', self-assessment, and 'just-in-time' assessment
- Providing greater access to and engagement with learning for hard-to-reach, disaffected and disabled learners.

This is seen as involving:

- E-assessment, including e-portfolios
- Digital resources which are:
  - extensive in terms of quantity and range
  - of high quality, including being innovative in that they make full use of available technologies and approaches (games technology, for example) and move from being content based to activity based
  - accessible, adaptable and re-usable.

Table 4 summarises the specific actions and milestones for Priority 3.

**Table 4** The actions and associated milestones for Priority 3<sup>5</sup>

Priority 3    Develop a collaborative approach to personalised learning activities	
<b>Action</b>	Enable practitioners to create, adapt, re-use and share resources through common access to digital resources for e-learning
<b>Milestones</b>	<ul style="list-style-type: none"> <li>• Exemplars available to practitioners to build capability, with measurable improvement in the availability of publicly funded resources and assets across sectors by 2006</li> <li>• Provide updated intellectual property rights (IPR) advice for all sectors by 2006</li> <li>• Feasibility study on implications of extending rights licences by 2006</li> </ul>
<b>Action</b>	Promote innovation by developing flexible learning activity design tools, ensuring that e-learning products are based on robust evidence of effective learning and teaching
<b>Milestones</b>	<ul style="list-style-type: none"> <li>• National framework of standards for pedagogical quality, accessibility, safety and development process criteria available online by 2006</li> <li>• A cross-sector e-learning innovation co-ordinating group in place, with appropriate representation, to develop business models and a cross-sector innovation fund, enabling procurement of e-learning activities customisable for different sectors and learner needs, for 2005</li> <li>• Programme of research on learning and pedagogy established by Engineering and Physical Sciences Research Council (EPSRC) and Economic and Social Research Council (ESRC) by 2006</li> </ul>
<b>Action</b>	Review and update the curriculum and qualifications to reflect the impact of technology on learning
<b>Milestones</b>	QCA to conduct consultation and report on proposals for modernising the curriculum and its assessment, as the opportunity arises, to ensure modernisation of content and skills, for 2005

Don't be too focused on evidence and impact – because it leads you to do the boring things. If you're interested in impact, then it's not going to work with Year 7! What tests demonstrate children's creativity and motivation? These are the important things that ICT supports. Interview 38 – CLC

## Four overarching themes

In late 2005 the DfES provided a further refinement to the e-strategy, which aligned each of its six priorities to four broad themes, which are outlined in Table 5.

**Table 5** The four overarching themes<sup>6</sup>

Theme	Aims to	Through
<b>Knowledge architecture (learner-centric)</b>	<ul style="list-style-type: none"> <li>• Enable a single comprehensive overview of every learner, thus better meeting the information needs of all key stakeholders (learners, parents, practitioners)</li> </ul>	<ul style="list-style-type: none"> <li>• A single, system-wide model of identity management</li> <li>• A strategy for developing e-portfolios</li> <li>• Common standards for information and data flows</li> </ul>
<b>Personalised content</b>	<ul style="list-style-type: none"> <li>• Enable practitioners to better design learning around the learner</li> <li>• Help learners build their individual capacity as effective learners</li> </ul>	<ul style="list-style-type: none"> <li>• A system-wide policy articulating concepts and approaches required for personalising content</li> <li>• Resolution of IPR, licensing and copyright issues to support fair-use policies</li> <li>• Tools and support for practitioners to create, adapt, re-use and share quality digital resources</li> <li>• Improved access to and discovery of digital resources</li> </ul>
<b>Strategic technologies</b>	<ul style="list-style-type: none"> <li>• Provide models of provision and support for institutions</li> </ul>	<ul style="list-style-type: none"> <li>• A single integrated national strategy for ICT infrastructure</li> <li>• A high-bandwidth national education network</li> <li>• Functional specifications to support interoperability</li> <li>• Learning and management services to link home and school</li> <li>• National framework agreements to support economies of scale</li> </ul>
<b>E-maturity</b>	<ul style="list-style-type: none"> <li>• Develop the capability and capacity of all leaders to harness ICT</li> </ul>	<ul style="list-style-type: none"> <li>• Self-review frameworks for schools and colleges</li> <li>• ICT quality mark to recognise successful institutions</li> <li>• Definitions of maturity, including measures for assessing progress</li> <li>• Better defining the conditions necessary to support sustainable improvements</li> </ul>

It's really hard to identify ICT-specific gains for learners, because there are so many other things changing in the schools at the same time – for example, change from single to mixed age groups, IWBs introduced, TA roles changed. You can't say any one of these was the key. We have very high standards: you can't attribute this to ICT. Interview 29 – LA



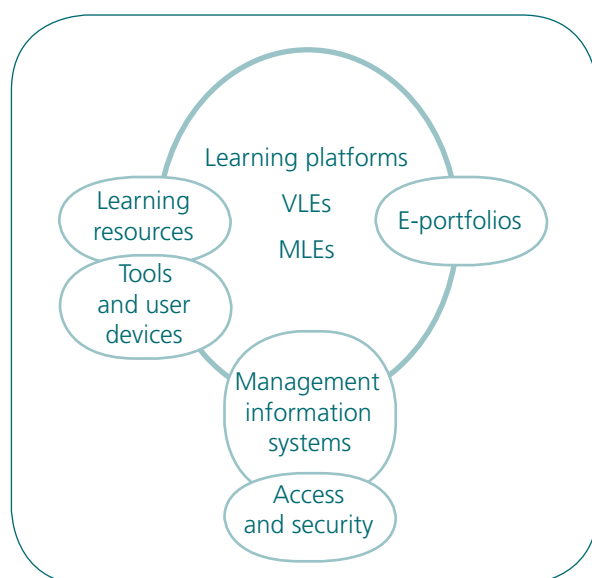
This review of the current response to Priorities 2 and 3 in the schools and FE sectors identifies future research and development needs. The interrelationships between Priorities 2 and 3 and the other four priorities in the e-strategy are acknowledged here, but do not form part of the review's brief. There were three key research steps:

- 1 Identifying organisations that were implementing the use of ICT that mapped on to Priority 2 and/or Priority 3 of the e-strategy
- 2 Establishing how these organisations were implementing Priority 2 and/or Priority 3
- 3 Evaluating the effectiveness of the different approaches.

### ICT functionalities

The technologies identified in Priorities 2 and 3 were categorised (see [Figure 1](#)). However, the fact that an organisation was implementing one of these technologies did not necessarily mean that it was working towards achieving the goals intended by the e-strategy. Ensuring that there was alignment between each organisation's vision and the vision implicit in the e-strategy was key to identifying exemplars that were most likely to inform our understanding of effective implementation of Priorities 2 and 3.

**Figure 1** ICT functionalities



The e-strategy focuses on specific technologies: the vehicles through which the education system will be transformed and enhanced ([panel 1](#)). However, the e-strategy lacks an overt statement of the educational vision that underpins the policy. In order to develop a shared understanding of the implicit vision underpinning the e-strategy, the review team extrapolated from it to develop the eSIR reference statement.

### 1 Transforming and enhancing the education system through ICT

Becta endorses the view that the e-strategy views new technologies as a vehicle to transform education: 'The Government's recently published e-strategy, "Harnessing technology" (2005), outlines its commitment to transforming education through the use of ICT/e-learning. At the core of the strategy is the belief that the appropriate use of technology can enable learners to learn more effectively and better realise their potential, as well as facilitating greater access to learning opportunities and making the delivery and management of learning more efficient and effective.' (Becta 2005c p8)

There is support in the literature for the view that new technologies are transformational (for example Graves 2001; Garrison and Anderson 2002) and will move education from a traditional, behaviourist, faculty-centred educational model towards a constructivist, student-centred one that can better meet the demands of the contemporary workplace and society, which emphasise self-directedness, lifelong learning, communication and collaboration skills (Oliver and McLoughlin 2000).

Referred to in ICT functionalities

### 2 The project team

The project team consisted of representatives spanning a number of key stakeholder groups, including:

- the FE community
- the early years, primary and secondary phases of education
- academia with a particular focus on educational ICT
- educational consultants, the commercial sector and policy makers.

Referred to in The eSIR reference statement section

## The eSIR reference statement

The eSIR reference statement, which is summarised in Table 6, was the shared reference point in identifying organisations moving in the direction indicated by the e-strategy. It was used in conjunction with the **ICT functionalities** (p13 **Figure 1**) as a practical tool to help identify relevant exemplars of good practice, and to provide a framework for collecting and analysing data on effective approaches to implementing the

e-strategy, with a particular focus on Priorities 2 and 3. The eSIR reference statement was pivotal to the project: its development involved extensive discussion drawing upon the expertise within the team (p13 **panel 2**) and analysis of the e-strategy, as well as consultation with a range of colleagues, including staff in Becta. See **Appendix 1** (pi) for a fuller description of the eSIR reference statement.

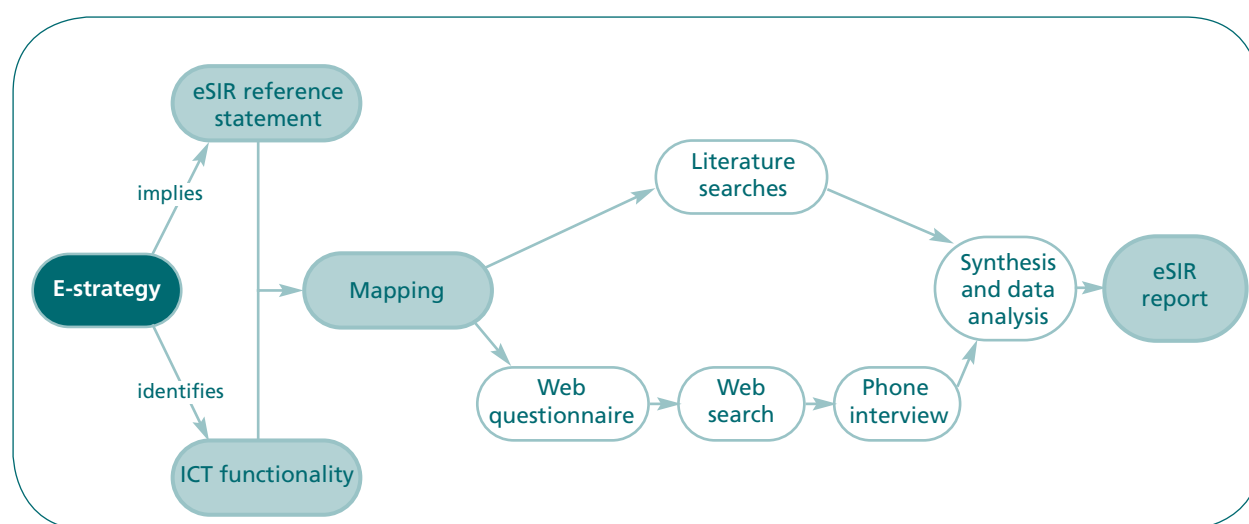
**Table 6** Summary of the eSIR reference statement

<b>Aims</b>	‘Smarter learners better able to cope with changing contexts’ – focus on enhancing learning, motivation <sup>7</sup> and lifelong learning <sup>8</sup> as important elements of this.
<b>Environment</b>	<p>The learning environment is the whole environment of the learner that is recognised as being relevant to the education system. It has two components:</p> <ul style="list-style-type: none"> <li>• The spatial environment – where learning takes place</li> <li>• The temporal environment – when learning takes place.</li> </ul> <p>Both the spatial and temporal environments that are considered relevant to the education system will expand<sup>9</sup>. In particular there will be greater emphasis placed on the home<sup>10</sup>, working across physical settings<sup>11</sup> and virtual settings<sup>12</sup>, and extending ‘the school day’<sup>13</sup>. This is all summed up in the phrase ‘anywhere/anytime learning’<sup>14</sup>.</p>
<b>Actors</b>	<p>The ‘actors’ are people and/or organisations involved in supporting learning, including teachers, support staff, learners, learners’ peers, parents and employers. There will be an increase in the involvement and availability of actors owing to the facilities that ICT offers, especially in relation to interaction ‘at a distance’<sup>15</sup>. In particular, greater emphasis will be placed on the role of parents<sup>16</sup>.</p> <p>Collaboration will be a key element to this diversification of actors and environments<sup>17</sup>.</p> <p>Learners’ choice, responsibility and control will become increasingly important as part of the ‘personalisation’ agenda<sup>18</sup>.</p>
<b>Curriculum</b>	The curriculum includes everything that learners learn. There will be a broadening of the curriculum both in the ‘subjects’ available <sup>19</sup> and in learner choice <sup>20</sup> . In particular, the curriculum is likely to offer more vocationally-oriented options <sup>21</sup> , and will place a greater emphasis on ‘core skills’ <sup>22</sup> .
<b>Support</b>	The range and nature of support, which includes teaching, will increase and diversify as the environments, actors and curriculum expand. In particular, there will be an increase in learner choice about when, where and how learners are supported <sup>23</sup> .

What’s needed is small-scale longitudinal studies – something that values learning environments, home and school, plus the school ethos of valuing actual learning and not just SATs. To say ICT is making a difference we need to be looking at different things – it’s part of the problem of what it is we are assessing for today’s world. Interview 46 – Commercial

It is clear from the e-strategy that the functionality which ICT can provide is central to meeting the goals set out in the eSIR reference statement. However, there is not necessarily an educational gain from simply implementing any particular technology: it is how it is implemented that is important<sup>24</sup>. We mapped the **ICT functionalities** (Figure 1 p13) onto the elements of the **eSIR reference statement** (Table 6 p14). This highlighted the importance of using technologies to transcend the physical boundaries of educational institutions, which included using internet-based technologies and mobile devices.

**Figure 2** Overview of eSIR approach



**Table 7** (p16) provides an overview of the data collection undertaken. This included preliminary 'orientation' phone interviews at the start of the project, and prior to the development of the eSIR reference statement. Following the web questionnaires, specific exemplars were selected and followed up in greater depth using web searches and extended phone interviews.

Respondents were atypical of the education community as a whole, in that they were all particularly knowledgeable about the use of ICT in education, based on their practical and often strategic roles in implementing its use in schools and/or colleges. Thus they represent a particularly well-informed group when it comes to understanding the issues surrounding the implementation of Priorities 2 and 3 of the e-strategy in the pre- and post-16 phases of education.

This framework informed the data-collection phase of the project.

Figure 2 gives an overview of the project. The web questionnaire (and therefore all the data collection) primarily focused on local authorities (LAs) and FE colleges in England, though we collected responses from the rest of the UK and other parts of the world (p17 **panel 3** provides more detail). Becta and a number of other constituencies were consulted at key points throughout the process, through discussions, interim presentations and feedback on drafts of key documents such as the **eSIR reference statement** (Appendix 1 pi).

Becta<sup>25</sup> has found that one-off projects often have no long-term impact, and thus little potential value in informing recommendations on the implementation of the e-strategy. Therefore exemplars needed to be embedded rather than short term. They also needed to be on a large scale or to have the clear potential to be scaleable if they were going to provide useful guidance. This led to the exclusion of 'charismatic schools' that were exceptional owing, for example, to the drive and determination of one particular person. Similarly, we treated with caution the data from contexts where the level of funding was significantly higher than that likely to be available to others. Thus the exemplars upon which this report is based are intended to be representative, and for that reason exclude some atypical examples of 'effective practice'.

**Table 7** Summary of data collection

When	What	Who
<b>August–September 2005</b>	16 preliminary phone interviews, each lasting about an hour	Direct phone calls to identified LA representatives who were likely to have an overview of e-strategy (eg advisers, inspectors, senior managers with responsibility for ICT/e-learning)
<b>November–December 2005</b>	125 responses to the web questionnaire from commercial (10%), post-16 (30%), pre-16 (42%), RBCs (4%) and other (16%) sectors	Direct emails sent to identified representatives from LAs, RBCs and FE colleges. Each of the JISC/RSCs was contacted and asked to circulate its mailing lists, as were the ACL/FE community managers in Becta. Emails also circulated on other key mailing lists, including FE Champions, Welsh Champions, ICTRN, ITTE, IFETS, EUN Policy and Innovation Committee list, leading teachers and the Scottish ICT Development Group. NAACE published information about the project in its weekly newsletter.
<b>November 2005 – January 2006</b>	48 phone interviews, each lasting about an hour: commercial (8%), post-16 (23%), pre-16 (46%), RBCs (8%), other (15%). Of the 48, 42 had completed the web questionnaire. Three people took part in both sets of phone interviews.	Seventy people were asked to take part in phone interviews. Most of these were identified from their responses to the web questionnaire, although six were people who had not filled in the web questionnaire but who were nonetheless deemed to have an important contribution to make.

Literature searches identified relevant evidence from both published and 'grey' sources relating to Priorities 2 and 3 of the e-strategy in general, as well as specific issues that emerged from our analysis of the data.

For fuller details of the data collection see panel 3 (p17)

### 3 Details of the data collection

#### Preliminary phone interviews

The preliminary phone interviews were targeted at specific senior staff of local authorities in England that had been identified as being relatively well advanced in the implementation of educational ICT. Three interviewers were involved, each of whom used the same script for each phone interview. The average length of the interviews was about an hour.

#### Web questionnaire

The web questionnaire was linked closely with the eSIR reference statement (summarised in [Table 6](#) on p14 and set out in full in [Appendix 1](#) on pi) and the [ICT functionalities](#) ([Figure 1](#) p13). Responses to the questionnaire were automatically saved in a database as each question was answered. Confirmation emails were sent to respondents to authenticate their responses. Completing the entire questionnaire took around 25 minutes, though it did not have to be completed in one sitting. Respondents who did not complete all the questions were excluded from the data set.

By the cut-off date we had received 125 complete responses. The respondents were split into groups, representing different phases of education or sectors (see [Table 3.1](#)). While there were only five respondents in the RBC group, this represents 50% of RBCs, and it did not seem appropriate to merge them with the pre-16 group as it seemed likely that they would have a different perspective owing to their particular roles and responsibilities.

The vast majority of respondents came from organisations based in the UK (90%), and predominantly England (82%). Other countries

represented were Australia (1%), Poland (1%), France (1%), Holland (1%), Greece (1%), Malta (1%) and the USA (2%), plus a few international organisations (3%).

#### Main phone interviews

The selection of interviewees for the main phone interviews was based on analysis of their responses to the web questionnaires. The criteria used included the closeness of the match between the vision of the respondent's organisation and the [eSIR reference statement](#) ([Appendix 1](#) pi), the apparent scalability of the ICT initiatives they were implementing, ensuring a reasonably even spread across pre- and post-16 organisations, and the willingness and availability of the respondent to take part in a phone interview. This accounted for 42 of the 48 main phone interviews. A further six people were also interviewed who had not filled in the web questionnaire, but had been identified by key stakeholder representatives as having a valuable contribution to make because of their position, experience or expertise.

Prior to each main phone interview we made a scheduling phone call, which also provided an opportunity to explain the focus of the interview. The main phone interviews lasted an average of about an hour. They were carried out by five researchers, each of whom used the same basic script to structure their questioning. The interviewer carried out a web search for information about the organisation prior to the interview. There were some minor variations in the procedure: for example, a number of the interviewees asked to see the record of their interview and annotated it with additional comments, which they returned by email.

[Referred to in Methodology \(p15\)](#)

**Table 3.1** Breakdown of the respondent groups

Respondent group	n=	% (n=125)
RBC: Regional broadband consortia	5	4%
Pre-16: LAs and schools	52	42%
Post-16: FE colleges, specialist colleges, sixth-form colleges, ACL	38	23%
Commercial: for-profit organisations	10	10%
Other: charities and other not-for-profit organisations	20	16%



## Complexity and human factors

The review's focus was on 'technological solutions' in the schools and FE sectors in relation to Priorities 2 and 3. However, it quickly became clear that the complexity of the changes that were needed in order to implement the relevant ICT functionalities effectively were such that respondents' prime concerns were with the issues of management of change associated with implementing such systems. Almost invariably these implementation issues related to 'human factors'.

The '**key implementation issues**' section of the report explores these issues in more depth, and includes sub-sections on:

- Complexity, change and the e-strategy (p66)
- Focus on people (p70)
- Buy-in (p74)
- Leadership (p77)
- Support (p79)
- Shared understandings (p82)
- Procurement (p86).

This section of the report explores the technologies being implemented and how they were being used, rather than concentrating on questions about how best to implement them.

## Evidence of impact

While learning platforms and other ICT functionalities were perceived as having an impact, many interviewees thought that it was too early to be looking for evidence of impact. This reflects the long time needed to embed complex systems that involve significant change<sup>26</sup>. The interviewees were also very conscious of the difficulties of 'measuring' the impact of ICT within education. There are two key contributors to this problem: firstly the difficulty of demonstrating causal links between particular interventions and learning gains; secondly, the mismatch between the measures that are typically used in our education system to judge learning gains and the learning that ICT facilitates. These issues are explored in more detail in **panel 4** (p20).

Where evidence of impact was available it was generally based on quantitative measures such as the numbers of user accounts, amount of content deposited and learning platform/portal hits. In a few cases this data was monitored by time of day and day of the week to try and get some indication of use outside school hours. A very small number of interviewees reported a positive statistical relationship between the use of their learning platforms and their SATs or GCSE results. However, as the interviewees themselves often pointed out, such correlations need to be treated with caution: a correlation does not indicate a causal relationship<sup>27</sup>.

Qualitative data including anecdotal evidence, case studies, 'generic' external assessments such as Ofsted reports, and observations of classroom practice informed the debate. However, this was not often collected systematically. External evaluation was rare and the use of benchmarking tools infrequent. Indeed, one interviewee cited the need to improve the measurement of success and project monitoring as a key lesson learnt (Interview 4 – LA).

The limitations of the evidence of impact in the data reflect a wider problem in the literature. Here, too, there is a lack of robust evidence of the impact of ICT on learning, with too much reliance on correlation studies, and insufficient use of longitudinal studies, observation data or appropriate measures of learning gains (see p21 **panel 5**).

## Areas for further research/development

The funded research focus should move to support:

- more longitudinal research<sup>28</sup>
- a systematically implemented mixed-method approach to evaluations<sup>29</sup>
- the use of techniques such as maturity modelling that can capture the dynamism and complexity of the system<sup>30</sup>.



### Overview

Online learning spaces are central to Priorities 2 and 3 of the e-strategy. However, it is unclear in the e-strategy precisely what functionality an online learning space could or should provide. The DfES<sup>31</sup> identifies learning platforms as a core vehicle for the delivery of learning spaces; these provide the core ICT functionalities that the eSIR team identified as being necessary for the delivery of the e-strategy, as indicated in [Figure 1](#) (p13 [ICT functionalities](#)). The DfES<sup>32</sup> defines a learning platform as follows:

‘It is an umbrella term that describes a broad range of ICT systems used to deliver and support learning. As a minimum, we expect it to combine communication and collaboration tools, secure individual online

working space, tools to enable teachers to manage and tailor content to user needs, pupil progress tracking and anytime/anywhere access. You might hear the term learning platform being applied to a virtual learning environment (VLE) or to the components of a managed learning environment (MLE).’

### Implementation and uptake

In order to ascertain the level of provision of a range of basic ICT functionalities relating to access and security, respondents to the web questionnaire were asked which of the following their institutions were implementing:

- Individual email allocation
- System security tools

## 4 Difficulties with identifying the impact of ICT in education

It is necessary to recognise that education is a complex, dynamic system of interrelationships and of checks and balances (Lesgold 2000). ICT innovations are difficult to assess because they are rarely directly causal (McFarlane *et al* 2000) and because the context is not a neutral backdrop on which the teaching and learning are played out. While many students, staff and researchers will testify to effective learning in technology-supported classrooms, these are existence proofs of effectiveness rather than the ‘hard’ evidence required to convince the sceptics of the value of educational technology (Underwood and Dillon 2004).

Much of the hard evidence quoted to demonstrate that ICT has had a positive impact on learning outcomes is problematic because it is based on statistical analysis; such claims are flawed because ‘Even if a correlation can be established between two variables, it is still not possible to assert, in an unproblematic way, that the one caused the other to happen’ (Scott and Usher 1999 p80). Recognition of this problem is reflected in the broad range of methodologies used to try to determine the impact of new technologies in education in major studies such as ImpaCT2 (Harrison *et al* 2003) and the ICT Test Bed project (Somekh *et al* 2005b).

The discrepancy between hard outcome measures and the experiences of teachers and pupils (Underwood and Brown 1997; Somekh *et al* 2005a) suggests the need for a re-evaluation of both the research questions and methods by which we were seeking to capture educational experiences (Wood, Underwood and Avis 1999; Underwood and Dillon 2004). The recognition of this need for a re-evaluation is an international phenomenon. In the USA, Lesgold (2000) argues that the problem we face in inserting new technologies into education is that they offer new ways of teaching but that old skills and content still need to be taught.

This is a critical difference and is exemplified by a report from the President’s Committee of Advisors on Science and Technology (PCAST) of one Californian school that invested in new technologies oriented to constructivist learning and then witnessing a drop in standardised test scores. This drop prompted parents to demand a ‘back to basics’ agenda (PCAST 1997 p90).

There is strong support for the view that we are using the wrong ‘measures’ when it comes to evaluating the benefits of ICT in education (for example Hedges *et al* 2000; Heppell 1999; Lewis 2001; Loveless 2002; McFarlane 2003; Ridgway and McCusker 2004). Heppell has long argued that the ways in which we assess learning that has been mediated by ICT is problematic, and has illustrated the problem using the following analogy:

*‘Imagine a nation of horse riders with a clearly defined set of riding capabilities. In one short decade the motor car is invented and within that same decade many children become highly competent drivers extending the boundaries of their travel as well as developing entirely new leisure pursuits (like stock-car racing and hot rodding). At the end of the decade government ministers want to assess the true impact of automobiles on the nation’s capability. They do it by putting everyone back on the horses and checking their dressage, jumping and trotting as before. Of course, we can all see that it is ridiculous.’ (Heppell 1994 p154)*

It seems clear that current assessment practices do not match well with the learning that ICT facilitates (for example Ridgway and McCusker 2004; Venezky 2001) and there is strong support for the need to change how we assess learning in order to rectify this problem (for example Kaiser 1974; Lemke and Coughlin 1998; Lewin *et al* 2000; McFarlane *et al* 2000; Barton 2001; ICTRN 2001; Trilling and Hood 2001).

Referred to in: Evidence of impact (p19);  
New assessment (including e-portfolios): Gaps and other problems (p56)

- Filtering and/or 'personal safety' tools
- Single sign-on systems, including Shibboleth
- Data-transfer optimisation such as caching or dynamic usage optimisation.

Most respondents' organisations (around 80%) were either already providing each of these services or were planning to do so. Where this was not the case, it was often because it did not come within the respondent's remit; for example, respondents in the commercial and other groups often did not focus on providing such services.

Of the 125 respondents, 86% reported that their organisation had implemented at least one learning platform. About 17% of respondents reported having

more than one learning platform, whereas 15% of pre-16 and 13% of post-16 organisations reported that they had no learning platform. However, there was confusion about the meaning of the term 'learning platform', which was interpreted to include anything from a shared file store, through a portal based on Google, to a managed learning environment that provided extensive user functionality, including integration with a management information system. It was also clear from the interviews that the level of uptake of learning platforms – particularly in schools – was still relatively low. This corresponds closely with data from three other surveys: one<sup>33</sup> reported that in 2005 22% of primary schools and 50% of secondary schools had an online learning environment; another<sup>34</sup> identified that less than 40% of primary schools and

## 5 Lack of evidence of impact in the literature

Passey, Rogers, Machell, McHugh and Allaway (2003) are not alone when they assert that there is little doubt that ICT in education can and is changing aspects of teaching and learning. For example, a range of studies (Pippert and Moore 1999; Susskind 2005; Apperson, Laws and Scepansky 2006) has found that lecturers who use PowerPoint presentations instead of non-digital technologies are rated as better on a wide range of teaching dimensions by their students. This positive halo effect for technology users was seen to spill over into activities unrelated to the lecture format such as handing back papers on time, providing helpful feedback, and assigning tasks requiring critical or creative thought. However, for every enthusiast there is a sceptic arguing that technology is, at best, irrelevant and also often arguing that technology is a drain on education (Cuban 2001; Reynolds, Treharne and Tripp 2003; Oppenheimer 2003). Hokanson and Hooper (2000) provide one of the more balanced debates on this topic. The problem is that evidence of the benefits of digital technologies in education is at best equivocal and often limited.

There is evidence that the advent and spread of new technologies has led to major changes in communication and interpersonal behaviours (Davies, Miller and Winston 2003; Ponchietti and Di Loro 2004). Readily available examples of this are the rise in internet use by adolescents (Gross 2004) and the impact of the mobile phone, which is fast becoming a ubiquitous tool in our society (Davies *et al* 2003). As Davies and his colleagues point out, and as many of us can attest from personal experience, for small businesses such as the local plumber or builder mobile phones have become the communication tool of choice. The question here is: Where are the equivalent visible signs of the impact of digital communications on the process and products of education?

While much thoughtful and illuminating research has been conducted into the impact of ICT on education, the story is not straightforward. For example, comparative studies show that students in electronic groups report more technical learning but less content learning than face-to-face groups (Scifres, Gundersen and Behara 1998), but that the delivery method (electronic or face-to-face) has no significant effect on students' overall performance (Butler 2000; Smeaton and Keogh 1999; Priluck 2004), nor do web students have better performance than classroom students (Scheines *et al* 2005).

Overall, the conflicting findings from different studies indicate that the success of technology-supported learning can be subject to a variety of factors and their interacting effects. There may not be a 'one-size-fits-all' approach that a school or college can use to guarantee a positive student learning result from the use of any particular technology (Zammit 1992). One of the major problems facing those trying to evaluate the effects of technology in education is that such effects depend completely on how the technology is used (Wegerif 2003 p31). This helps to explain why the only firm conclusion that can be drawn on the basis of existing evidence is that specific technologies can enhance learning if used in specific ways within particular contexts (for example Moseley *et al* 1999).

[Referred to in Evidence of impact \(p19\)](#)

about 60% of secondary schools used a learning platform; the third<sup>35</sup> reported that, while 95% of FE colleges had an intranet, only 66% had a virtual learning environment (VLE).

Of the 108 respondents who said that their organisation did provide a learning platform, over 80% said that it could be accessed 'anywhere that they [users] have access to the internet', while 4% of these respondents reported access restricted to specific locations. This compares with the DfES<sup>36</sup> figure of 29% of schools that were providing access to the school network from beyond the school premises in 2004 and the Becta<sup>37</sup> figures of around 20% of primary schools and 37% of secondary schools providing access to a learning platform 'remotely' in 2005.

Learning platforms were generally provided by these 108 organisations for use by students (97%) and staff (94%); 47% were providing access for parents and/or other members of the community.

The 103 respondents who identified their learning platform(s) by proprietary name mentioned 128 different systems. One open source VLE was the most frequently named system, representing 23% of the total 128. The next were 'in-house' systems (9%), followed by two proprietary VLEs (both with 7%). There was some variation across the respondent groups, with the open source VLE accounting for 34% of post-16 systems compared with 20% of systems used in schools.

## 6 Factors influencing choice of learning platform

A key driver for many respondents related to cost. The cost of licence fees was a particular problem for some FE colleges with part-time students. In at least one instance an FE college chose to provide an open source VLE for all students rather than buying in a proprietary system just for full-time students (Interview Ex43 – FE). As this example illustrates, the use of open source software was seen as a distinctive advantage on cost grounds. A range of other benefits of open source systems were also identified, such as:

- the availability of a large and supportive development community
- the ease with which new features can be added
- the speed with which bugs are spotted and corrected.

However, several respondents highlighted the additional responsibilities associated with implementing open source solutions and the need for greater in-house technical support.

The ease of use of systems was seen as another important factor. Ease of use depends on a number of factors, including interface design. However, perhaps even more crucially, it depends on the closeness of fit of the pedagogical model underpinning the design of a particular learning platform and that of the users.

*We were able to get a lot more for our money from the portal as the RBC [name] had already conducted a procurement exercise for a regional portal, and we piggybacked on that. So that's one reason for using [name of learning platform]. It met their requirements at the time, and it had already had a framework agreement done.*

*(Interview 24 – LEA)*

*We're trying to cut down the cost of licensing, due to lack of value for money from [name of proprietary system]. We are doing it ourselves: it's so easy to implement [the open source learning platform] – there's little in the way of development, it feels like it is possible to do it and low resources are required. A community of practice, support, technical support is all there at little cost. Financially it's the way to go. The one question mark is interoperability, but we are optimistic that this will be OK. Promises from [name of proprietary learning platform supplier] were negative regarding interoperability.*

*(Interview 15 – FE)*

*[Name of open source learning platform] needs a lot of support and expertise in schools that is not there. ... Non-open-source solutions are more expensive, but we have the expertise to manage them. ... We'd prefer open source – but a lot of open source does require experts in schools which we don't have.*

*(Interview 29 – LEA)*

*In terms of functionality of VLEs, some commercial ones had good features but you couldn't see them being used due to their complexity. In that journey to take teachers from low-level to transformational use of ICT, you had to find something straightforward and easy to use.*

*(Interview 44 – LEA)*

*I'm a fan of [name of open source learning platform] ... but [it] is a course-delivery tool, not a VLE – e-mentoring is something it does not do as well as [name of another open source learning platform], for example. ... we don't all want course delivery ...*

*(Interview 40 – Other)*

It was evident from the data that some of the in-house learning platforms were actually based on existing open source systems (and on one in particular), so the percentage share of the market that this open source system has in our sample is actually higher than the figures suggest. Several of the interviewees, particularly in the FE sector, were in the process of migrating from a proprietary system to this particular open source VLE, which might suggest that its market share is going to rise in the future.

*One school, for instance, which already had a learning environment that they had paid for, evaluated this against the [name of open source VLE] environment which they received free from [LA name]. They ran the two in parallel for six months, and ditched the paid-for service and chose [name of open source VLE]. (Interview 5 – LA)*

Functionality, cost and ease of use were all factors that influenced decisions about which learning platform(s) to implement. **Panel 6** (p22) gives more details about some of the issues influencing the choice of learning platform.

Figure 3 shows a breakdown of the functionality implemented by respondents' organisations. While this provides a very positive picture, with most respondents' organisations already implementing or planning to implement a wide range of functionality, the interviews indicated that the level of use of these systems was very variable, and tended to be much lower than the level of implementation might have indicated.

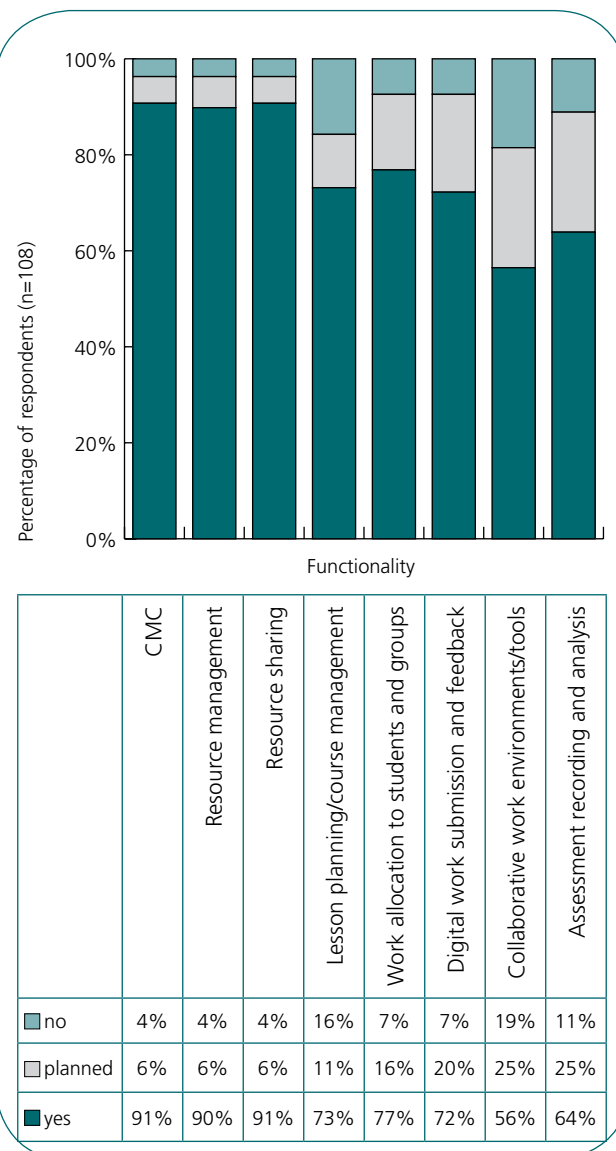
*There is lots of hype around it [using learning platforms] ...*

*(Preliminary interview 3 – LA)*

*There is the full spectrum from non-use to fundamental use.*

*(Preliminary interview 4 – LA)*

**Figure 3** Summary of learning platform functionality



There was wide variation in the reported levels of use of learning platforms, with few examples of significant uptake, and large swathes of the potential user population barely affected. This reflects the findings in the literature, which for example indicate that only 20% of FE and sixth-form colleges' VLEs are in frequent use<sup>38</sup>. Where large numbers of users were identified as being active in our data, this was often at least partly related to the size of the overall pool of potential users, and thus the raw numbers could be misleading.

There are about 80 schools in the LA, a small handful that don't have broadband – all secondaries are on 10MB; most primaries are on 2MB and being upgraded.

Preliminary interview 8 – LA



*We have now had 350,000 users since 1999 – that is, individually named teachers and/or students. The number of currently active users in a 30-day period would be 200,000. We have a wide geographical spread and mostly shared access in terms of equipment, so the spread of activity is fairly even. We average about 700 concurrent users in a 24-hour period.*

*(Interview 3 – Other – an international provider of learning platforms)*

Several respondents pointed out that ‘active use can mean different things’ (for instance Preliminary interview 5 – LA), and it appeared that high levels of use often involved:

- accessing content rather than utilising the communication, collaboration or assessment tools offered by the system
- use outside normal school/college hours
- use by students with minimal teacher involvement (and often not in school/college).

Becta<sup>39</sup> reported that in less than 20% of FE and sixth-form colleges the use of email to communicate between staff and students was common practice, while student-to-student email communication was common in 28%. Where computer-mediated communication (CMC) was taking place, there was little evidence in our data to show that it had yet progressed beyond online socialisation or, at

best, information exchange (see [panel 7](#) for details of Salmon’s stages of progression for computer-mediated communication).

*The [learning platform name] is very heavily used after 4.30 pm, which is an indicator of more anytime learning. ...*

*(Interview 22 – LA)*

*Collaboration between students is manic! ... [The interviewee then showed the interviewer the site statistics for October 2005, which showed:*

- 22,308 registered users
- 177,138 logins to the site during the month – this means on average each user logged in to their workspace 7.9 times during October
- 179,382 accesses to the new-look communities
- 411,679 messages sent
- The total number of assignments sent via the [learning platform name] was 4,698.]

*This does show an improvement on previous months, but we expect this number to continue to rise as you get used to the improvements made to this area.*

- [The number of accesses to the learning materials on the site rose to its highest level of 10,603
- The live learning mentors were contacted 2,322 times...]

*(Interview 20 – LA)*

*It is mainly used in secondary schools, and almost always by students and not teachers. It is often introduced by a limited number of teachers who’ve got an interest in it and who have probably told their students about it. It is not intended to be used within the curriculum and so imposes no change on the school day. Instead it is probably used at home, during lunch hours or at homework club, when pupils have access to a computer.*

*(Interview 35 – Commercial)*

Our data suggested that learning platforms were being used for partially online (blended) learning, but there was little evidence that it was being used for totally online (distance) learning. This might seem unsurprising for the pre-16 organisations, as distance learning is generally perceived as being inappropriate for younger learners<sup>40</sup> – though there are exceptions to this in the UK, such as Notschool<sup>41</sup>, and distance

## 7 Salmon’s five-stage model

Salmon (2000, 2003) described a model showing the stages that learners progress through when using computer-mediated communication (CMC). While this model was based on adult learners at the Open University, it would appear to apply equally well to all learners.

**Table 7.1** Salmon’s five-stage model (adapted from Salmon 2003 p29)

<b>Stage 5 Development</b>	<ul style="list-style-type: none"> <li>• Self-directed activity</li> </ul>
<b>Stage 4 Knowledge construction</b>	<ul style="list-style-type: none"> <li>• Building upon other people’s contributions (as part of structured activities)</li> </ul>
<b>Stage 3 Information exchange</b>	<ul style="list-style-type: none"> <li>• Asking questions</li> <li>• Answering questions</li> <li>• Sharing information</li> </ul>
<b>Stage 2 Online socialising</b>	<ul style="list-style-type: none"> <li>• Getting to know group members</li> <li>• Establishing ethos and expectations</li> <li>• Sending and receiving messages</li> </ul>
<b>Stage 1 Access and motivation</b>	<ul style="list-style-type: none"> <li>• Finding out how to read and post messages</li> <li>• Accessing the conference</li> </ul>

learning for school-age children has a long history in other countries<sup>42</sup>. In higher education there is a blurring of the distinctions between blended and distance learning<sup>43</sup>, and it seems likely that in the future this will increasingly become the case for other phases.

Our data supports the literature's suggestion that educational institutions are increasingly adopting learning platforms, in association with a range of both fixed and portable hardware, to support learners of different ages and levels and to take advantage of the convenience of anytime/anywhere learning<sup>44</sup>. However, the current overall picture of patchy uptake of learning platforms evident in our data reflects the broader picture of ICT use reported in the literature<sup>45</sup>.

### Example 1 – Introducing a VLE to schools

In response to the DfES target that schools will have access to learning platforms by 2008, one LA has implemented a VLE, which it is making available free of charge to its schools. By providing schools with free access to a VLE, the LA hopes to build a community of schools that have an understanding of what a VLE is and how it might be used, as well as the necessary expertise to make informed decisions about which VLE to use and how to integrate it with their students' learning.

In the first year of the initiative, 12 schools (out of approximately 250 schools in the LA) opted in to the scheme. A number of these dropped out because of Ofsted inspections or losing key staff. However, others joined later, leaving 12 schools that are actively using the VLE – although to varying degrees. Some schools are using the system to store documents rather than keep them on the school server. One school has set up its own digital arts qualification and is teaching art through digital technologies, using home-grown resources. That school is making substantial use of the facilities offered by the VLE and students are starting to become more expressive about what they do.

While the LA feels it is too early to evaluate the impact of this initiative, it perceives that where the senior management and staff in a school are committed to integrating ICT as part of 'normal teaching and learning' rather than just as part of ICT, teachers are beginning to find ways to make effective use of the tools the VLE provides.

### Example 2 – Supporting staff use of a VLE in an FE college

One FE college has been using a proprietary VLE for three years 'with varying degrees of success and frustration'. In early 2005 it was decided to migrate to an open source VLE, which seems to be used far more by teaching staff than the previous system was. The decision to migrate from a proprietary to an open source system was based on a number of factors, including the quality of the service they felt they had received and the differences that they anticipated in reliability and speed of development between the two systems.

Central to their use of a VLE is the provision of support for the system. There are a number of key elements to this, including:

- one member of staff dedicated to ensuring that the VLE system is running smoothly day to day
- a team of developers who develop resources for the teaching staff to use, and who work closely with them to ensure that the resources are meeting their pedagogical needs
- an ILT champion in each department who has 60 hours remission from teaching per year so that s/he can work directly with their academic peers, supporting them in thinking about how to use the technology most effectively to enhance their students' learning. Importantly, the ILT champions meet regularly to share experiences and expertise, which they can then feed back into their own departments.

All 15 departments in the college are active users of the VLE. Of these, five or six are making substantial use of it – giving students guidance, interactive teaching materials, annotated links to websites, interactive quizzes and other materials to support students' recap of face-to-face sessions.

### Gaps and other problems

Internet access remains an issue. Our interviews indicate that the significant minority of schools that do not have broadband or have lower-specification broadband connections (only 2Mbps, for instance) are finding the available bandwidth insufficient for their needs. This reflects Becta's<sup>46</sup> findings in 2005 that:

We monitor usage in schools – many secondary schools are using the internet extensively which means they often think the service is not good. The reality is that they're reaching their limit of 2Mbps. [RBC name] are upgrading the connectivity to 10Mbps, and access will then fly again until they reach the next saturation point... Interview 7 – RBC

- over 40% of secondary schools have a 2Mbps or slower internet connection
- over 60% of primary schools have a 2Mbps or slower internet connection
- over 13% of primary schools have a 512Kbps or slower internet connection.

These bandwidth problems should decline in schools as RBCs complete their roll-out of broadband, at least until schools 'reach their next saturation point' (Interview 7 – RBC). However, it seems likely that demand for bandwidth will increase as schools and colleges start to make greater use of learning platforms and multimedia applications, so that this issue will need to be regularly readdressed.

It was clear from the questionnaire data that there is great confusion about what a learning platform is. Given the relative ICT expertise of our informants, it seems likely that, within the education community as a whole, the level of confusion will be even higher. This view was reinforced by the interviewees, who also identified a lack of understanding in schools and colleges about how to integrate learning platforms effectively in their practice. These issues are explored in more detail in the section on key implementation issues (see in particular p82 [Shared understandings](#) and p70 [Focus on people](#)).

Another important issue raised by the data related to the proliferation of learning platforms (and other systems), which some interviewees felt could stand

## 8 A national learning platform?

There is widespread agreement in the interviews that interoperability needs to be achieved in relation to learning platforms.

*Interoperability is the key issue. Clear and high standards are urgently needed (for example learning platforms).*

(Interview 36 – LA)

*It needs to be standardised – operations and versions of equipment so that interoperability will work.*

(Interview 12 – FE)

One approach to this is through standardisation; the other is through developing shared standards. Becta is currently working on the latter, for example through its functional requirement specification for learning platforms (Becta 2006e).

There was recognition in the interviews that achieving interoperability inevitably meant compromise, and that there were vested interests that might resist any move towards standards or standardisation.

*There is a conflict between policies promoting schools as independent, self-governing bodies with the need to develop sophisticated, resource-intensive technologies which are interoperable. Collaboration sometimes means that not everyone can go their own way. Interoperability can be compromised by the commercial interests of vendors. While workarounds may be possible, this consumes valuable resources to little direct effect.*

(Interview 36 – LA)

Some suggested that ring-fenced funding should be used to encourage standardisation.

*Ring-fenced funding is one way of encouraging standardisation and getting standardised infrastructure and specification – otherwise there will still be an ad hoc system. It needs uniformity.*

(Interview 31 – LA)

Some went further than this, indicating the need for much greater centralisation of decision making about standardisation.

*You can't run a railway by handing over the timetable to 25 thousand autonomous station masters. We need collaboration and leadership. Certain decisions are strategic that aren't amenable to delegated decision making.*

(Interview 19 – RBC)

Two interviewees described the provision of the ICT infrastructure, which at the very least included internet connectivity and the learning platform, as being 'the fourth utility'.

*Also focused government funding in the last two or three years has been good, but I am concerned that the DfES is changing its approach to funding a bit, placing it in a global pot and recognising heads' professionalism to assign funding according to need. But in terms of ICT, such as internet connectivity, it's really a fourth utility, so that certain formulae are necessary to know and provide how much is needed for these things. If heads or schools are left to make decisions on allocating funding, key areas may be missed, and practice may become fragmented owing to changing priorities. Ring fencing has been a useful tool to moving ICT and the VLE forward. Allowing freedom of spending and schools opting not to do such things may be an excuse for sustaining mediocrity.*

(Interview 31 – LA)

*There are no tangible assets of belonging to a community like [name of learning platform], so valuing it is potentially harder as it's a utility. How much do we value electricity or gas until the price goes up?! And increasingly it's like that with things like [name of learning platform]. How do we get people to value it like that, for it to be seen as a utility so that it's not noticeable?*

(Interview 7 – RBC)



in the way of development. It is clear that the pre- and post-16 phases are currently implementing a diverse range of learning platforms (according to the questionnaire responses, more than 20 different ones were being implemented across the organisations in our sample). A central question is 'To what extent is a limited-diversity approach in some areas, such as the deployment of learning platforms, appropriate in a diverse sector comprising increasingly autonomous schools and colleges?' One interviewee suggested that a national learning platform should be adopted, a view which was supported by many of the other interviewees when subsequently asked about it. However, an equal number of interviewees felt that this was inappropriate owing to the varied needs of different users, the early stage in the evolution of

learning platforms, and our lack of understanding of the different pedagogical implications of different systems, including ones which may be developed in the future (for further details see p26 [panel 8](#)).

### Areas for further research/development

The development of learning platforms and their integration into schools and colleges is still at an early stage. More work is needed to explore how best to:

- use learning platforms to meet the vision implicit in Priorities 2 and 3 of the e-strategy, which is set out in the eSIR reference statement
- bring about the changes in the systems and pedagogical practices in schools and colleges to enable learning platforms to be used in these ways.

Many respondents recognised the benefits of having some degree of centralisation of ICT systems, including email, learning platforms and MISs.

*It [developing a shared VLE in collaboration with three schools] is so much more sensible than each institution doing their own little thing. You could develop specialised consortia within local areas. It has been very useful for us with being so rural and isolated.*

(Interview 12 – FE)

*If a learning platform is over a bigger region than a school – for example [name of county] or Denmark – then its influences are quite different. As learners go into a bigger space, some interesting consequences occur. The focus on the school is a bit worrying [too narrow].*

(Interview 47 – Other)

One respondent suggested that perhaps there should be a national-level learning platform for FE.

*To take it to its ultimate level, should there be a national/regional FE VLE, where all students share the same platform? In the vision of 'Harnessing technology', perhaps that's what we should be working towards, although most colleges have their own VLE.*

(Interview 39 – FE)

Another liked the idea of a national learning platform and felt quite strongly that the Government should adopt one learning platform as part of Building Schools for the Future (BSF).

*I would be delighted if there were a central open-source VLE provided at national level – which commercial companies could support, expand, populate with content, and so on. ... BSF is a once-in-a-generation opportunity ... but we must avoid too much diversity by developing the basic infrastructure once, rather than lots of times. For BSF we should have a BSF VLE ... it must be open source ... we must have clear direction – lots of the*

*functionality is obvious and common. ... We can then focus funds on enhancements.*

(Interview 14 – RBC)

Some other countries have taken the line of adopting one national learning platform.

*There is a lot of interest across the European Union in VLEs and so on – there are 25 countries in all and clearly differences between them in many ways. New accession countries tend to be still concentrating on equipping schools and training: getting computers into schools and learning platforms tend to be the second or third wave of government spending. In northwest Europe the situation is rather similar to the UK. This type of thinking [about learning platforms] is most developed in Scandinavia, the Netherlands and parts of France. Luxembourg has gone the whole hog, but it is a small country. ... Across Europe there is a wide range of platforms in use – some bought in, some open source such as [name of leading open source learning platform], and quite a number of home-grown ones. ... In some countries having your own learning platform is a prestige product in the way having your own country's airline is.*

(Interview 47 – Other)

One respondent suggested that this was already happening by default within the FE community in Wales.

*[Name of open source learning platform] uptake in Wales is 50% and growing – I see this as becoming a national (Welsh) system by default ... The sector has voted with their feet and adopted [name of open source learning platform] – we have a [name of open source learning platform] user group in Wales that helps co-ordinate developments. ... There is also the [name of open source learning platform] community, which my programmer is part of. 'Not invented here' will not go away. The ability to bespoke and customise is the way to go.*

(Interview 43 – FE)

continued overleaf

## panel 8 continued

An equal number of respondents did not think that having a national learning platform would be a good idea, for a variety of reasons.

*There's not one hat to fit all: [name of learning platform] works as an online discussion forum. It will sit with other devices and can be adapted, but is not a ubiquitous solution to everyone. [Name of another learning platform] is purely for work. VLEs are trying to cover everything – portfolio work and assessment.*

*(Interview 9 – School)*

*If it's done at government level, they are good at setting the standards – Shibboleth for example. Where Government is bad is the checklist mentality – they choose everything a VLE should be able to do, for instance, without thinking about the context of what you want to use it for, or the functions and issues to be addressed.*

*(Interview 20 – LA)*

*It is harder for those who have a single solution to sustain this in the longer term. They may still have a default solution, but a single solution will have to integrate far more so with local solutions. ...the integration of LA solutions and school solutions needs consideration.*

*(Interview 7 – RBC)*

*It's not the first time a national [name of open-source learning platform] system has been suggested. I think that it is necessary, but we must have innovation from the bottom up. We must stop waste of effort and resource, but nobody has the knowledge to say that these are the tools that will develop effective learning in secondary schools. We must not cut across innovation too soon: it's too early to know and tools are changing too rapidly. I'm a fan of [name of open source learning platform] – we are working on the LAMS and [name of open source learning platform] integration, but [name of open source learning platform] is a course delivery tool not a VLE – e-mentoring is something it does not do as well as [name of second open source learning platform], for example. There should be several flowers – we don't all want course delivery ... There are other systems ... develop user communities who share costs and thoughts ... rate of development is important, we need a funded model. [Name of third open source learning platform] and [name of second open source learning platform] are both supported by Government.*

*We're not yet at the stage where a top-down limited model will work. We don't know what the right models are – we're still learning. At some point, given sufficient flexibility, then top-down development would be appropriate. We need to cut out waste. It must be providing what people*

*want – we must keep enough flexibility and it must be done at school level, not at LA or RBC level.*

*There must be alternative choices – one size does not fit all – so a regional level VLE is a problem if only one VLE is provided. For instance [LA name] provides [name of proprietary learning platform] and [name of second open source learning platform] to allow clustering. Other LEAs want to control and own schools. We shouldn't be blocking initiatives that are pedagogically driven.*

*(Interview 40 – Other)*

One interviewee who was resistant to the idea of a national system hinted at some of the key features that any such system would need to have.

*Originally, we had a regional learning platform [name of system] from 2000. I feel we were probably in advance of ourselves in integrating this service, as take-up by schools and adoption by LAs was slow. While this was beginning to increase, we decided not to buy into the next version when it became available in 2004. This was due to the work time and financial cost required, and we were not convinced that having a single product at the core of a service for the whole region was the right solution to go with. ... It [our new/replacement system] provides a basic set of tools that are deliberately basic, as we don't want a single learning platform – just a single default set of tools: email, shared folders, authentication, and access to a secure environment with filter. This also means that schools or LAs can plug in other products or a learning platform...*

*Having a solution that gives a default position and enables choice will be essential. This is moving the focus to resource discovery from structured presentation – you can't structure everything, and so need to prepare for working within less structure. We want to follow the best practice of others (Scotland has a wider integration network, also CLEO). We don't all have to be the same, as that won't work. But if we can identify key areas where we can get a standard approach ...*

*There are some industry drivers, but there needs to be a coherent network, or industry won't want to plug into it. Schools can't create system-wide implementation, so we need an appropriate infrastructure as the industry standard.*

*(Interview 7 – RBC)*

Referred to in Learning platforms: Gaps and other issues (p27)

## Overview

Management information systems (MISs) have a key role to play in bringing about the changes envisaged in the e-strategy, particularly in relation to Priority 2. Becta<sup>47</sup> states that MISs could help schools improve their performance as learning institutions and suggests some ways in which this might occur:

This could, for example, be through the use of MISs to reduce the administrative burden on school staff, or by making more efficient use of expensive teacher time through more effective timetabling. It could be by facilitating a more individualised learning approach by matching curriculum resources to particular teaching and learning activities, or by making a wide range of assessment and analysis tools available to teachers so that they can better understand the attainment of the pupils in their care. It may be by providing appropriate online access for parents as part of a wider initiative to improve home–schools links and thus enhance the contribution parents can make to their children’s education.

For MISs to have the impact envisaged in the DfES e-strategy, they will need to focus on the needs of individual learners and making information accessible from outside school<sup>48</sup> and to a wider range of actors, including parents.

## Implementation and uptake

Of the 125 respondents, 83% identified that their organisation had implemented one or more management information systems. This increased to 91% for the target group of 90 pre- and post-16 organisations. Confusion as to what counted as an MIS means that these figures are likely to be an overestimate. MISs from two suppliers dominated, accounting for 40% and 11% of systems respectively. Becta’s survey<sup>49</sup> indicates that SIMS (from Capita) clearly dominates in both primary and secondary schools, accounting for 55%–75% of the market (depending which modules/functions are being considered).

Respondents to the questionnaire in both the pre- and post-16 phases indicated that MIS data was predominantly provided for use by staff in the

organisation, including managers, administrators and teaching staff. Other actors (including staff from other sectors, parents and students) were much less commonly allowed access to any MIS data. See [panel 9](#) (p30) for further details.

## Examples

The phone interviews provided little evidence that MISs were being used to enhance learning. The primary focus of interviewees was on the lack of integration of learning platforms and MISs (see p31 [Learning platform/MIS integration](#)).

One interviewee talked about the importance of assessment for learning and suggested that MIS data could be used to monitor performance and target teaching resource in order to enhance student progress. He believed that the key to learning enhancement was how data was used. He suggested that MIS data should be shared with students and parents, and that it was important to have easy-to-understand targets and provide students with regular feedback (every three or four weeks) about how they were doing in relation to those targets.

## Gaps and other problems

There was a lack of shared understanding of what an MIS was, with respondents identifying anything from Microsoft Access plus Excel through to a commercial MIS when asked to name their organisation’s MIS. For example two respondents identified an open source VLE as their MIS. The level of confusion in the wider education community is likely to be even greater, given the relative expertise of our respondents.

While many of the interviewees mentioned MISs, they tended to do so in relation to further development needs. There was a clear view that MISs should be playing an important role in enhancing standards in schools, but a feeling that there were technical barriers to their effective use, particularly in relation to lack of integration with learning platforms (see p31 [Learning platform/MIS integration](#)). It was not clear how MIS data should be used most effectively or who should have access to it, and there were concerns about security issues related to access to MIS data for people outside school.

A key thing is having a single MIS across the LA. Multiple systems don’t work and you can’t support them. You can’t change MIS once you are into one system. You can’t change – it costs too much. Preliminary interview 15 – LA

### Areas for further research/development

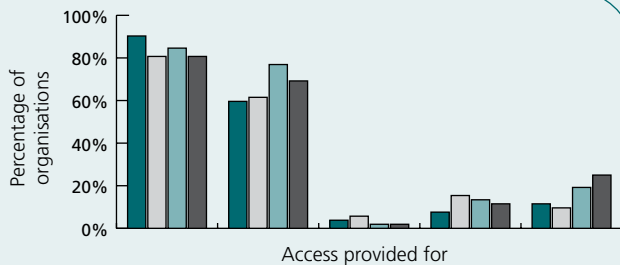
Further work is needed to:

- increase understanding of how MIS data could be used most effectively to enhance learning, including exploring issues relating to staff development and workload
- develop secure access to MIS data for parents and other actors outside school, and to identify how to maximise the potential benefits of such provision
- examine the ethical and privacy issues surrounding the use of MIS data by staff, students, parents and other actors outside school/college.

## 9 Access to MIS data

Figure 9.1 shows the percentage of respondents who reported that their pre-16 organisation provided access to different types of MIS data for different actors. For each of the four data types considered, teaching staff were less likely than management and administrative staff to have access to MIS data. Staff in the education sector were more likely to have access to MIS data than staff in other sectors or than parents or students. Fewer than 20% of the 52 pre-16 organisations in our sample allowed access to MIS data for students, parents or staff in other sectors, except in relation to 'management data' in the MIS (timetables, for example), which were made available to students by 25% of these organisations.

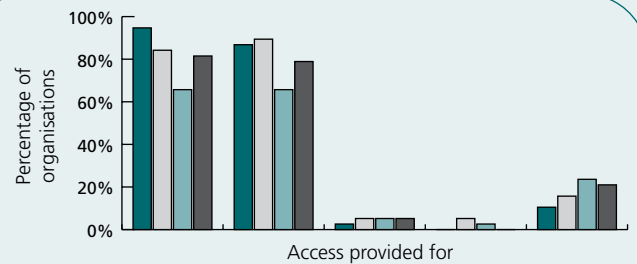
**Figure 9.1** Summary of access to different types of MIS data for different actors in the pre-16 organisations (n=52)



	Management & admin staff	Teaching staff	Staff in other sectors	Parents	Students
Personal data	90%	60%	4%	8%	12%
Attendance data	81%	62%	6%	15%	10%
Assessment data	85%	77%	2%	13%	19%
Management data (eg timetables)	81%	69%	2%	12%	25%

Figure 9.2 shows the percentage of respondents who reported that their post-16 organisation provided access to different types of MIS data for different actors. There appeared to be little difference between the levels of access provided for management and administrative staff and teaching staff within the post-16 organisations. Parents and staff in other sectors were rarely allowed access to MIS data by these post-16 organisations. Over 20% of them provided access to assessment and management data (timetables, for instance) for students.

**Figure 9.2** Summary of access to different types of MIS data for different actors in the post-16 organisations (n=38)



	Management & admin staff	Teaching staff	Staff in other sectors	Parents	Students
Personal data	95%	87%	3%	0%	11%
Attendance data	84%	89%	5%	5%	16%
Assessment data	66%	66%	5%	3%	24%
Management data (eg timetables)	82%	79%	5%	0%	21%

Referred to in Management information systems (p29)

Most current MISs are on site – we want to do an off-site service, tied to the anytime/anywhere agenda. It would be much easier to deliver off site, as this would mean we don't have to maintain countless support services to make all the individual on-site systems happen. Effectively this off-site service would be a central service at, say, local-authority level. Interview 19 – RBC



## Overview

Becta<sup>50</sup> states:

'It is difficult to see how this priority [Priority 2] could be successfully delivered other than through effective integration between school MISs, the systems that provide the online learning spaces, and those being developed to support e-assessment.'

## Implementation and uptake

The questionnaire responses indicate that a lack of integration of learning platforms with MISs was the norm: 44% of respondents said that their learning platform and MIS were not integrated at all; a further 29% said that they were not very well integrated. Only 9% of respondents said that their learning platform and MIS were fully integrated. However, this is probably an over-estimate, as there was a good deal of confusion about what 'integrated' meant. The lack of integration reflects findings in the literature, where for example only 25% of post-16 institutions reported that their VLE was linked to the college's MIS<sup>51</sup>, and less than 5% of school learning platforms were linked to MISs<sup>52</sup>.

There was strong agreement among the interviewees about a need for standards to enable systems to interoperate, particularly in relation to MIS/VLE integration. However, there was little agreement about how to achieve this.

## Examples

Perhaps not surprisingly – given the low reported level of integration of learning platforms and MISs – very little comment was made about schools or colleges making use of management information data as part of their teaching and learning. No examples of systems were identified which satisfactorily integrated the four key strands:

- 1 Extending access and developing pedagogy through deploying VLEs effectively
- 2 Providing management and administrative information through the MIS to allow targeting of learning and teaching (a dimension of personalisation)
- 3 Providing teachers and learners with a rich array of resources through repositories
- 4 System security (and hence reliability) through authentication and other systems.

## Gaps and other problems

During the interviews it became clear that respondents might take integration to mean anything from being able to access both systems through the same web interface (even though there was no transfer of or access to data across the systems), manual transfer of data between systems, batch processing of data for uploading, through to full and transparent data transfer/access across systems. This problem was compounded by the problems identified in relation to the confusion about what constituted an MIS or a learning platform (see p82 [Key implementation issues: shared understandings](#)).

MIS/VLE integration was an important end-goal for many respondents. However, there was little evidence from the interviews of what functionality was required of such an integrated system. The benefits from MIS/VLE integration might be quite different for different actors and across sectors. For example, the complex and dynamic class populations found in FE mean that VLEs are only usable at a general level if teachers can be sure that learning materials can be directed at the precise target group for which they are responsible. This requires automatic population of the VLE with up-to-date class lists. However, in primary schools such problems may be less prevalent; at least for local purposes, manual entry of class lists may be an easily accomplished one-off task. On the other hand, increased reporting and monitoring requirements may be much more easily met if there is MIS/VLE integration.

## Areas for further research/development

Becta<sup>53</sup> is already giving priority to addressing the issue of interoperability of learning platforms and MISs. However, further work is required to explore the extent to which modular architectures will allow people to use what is available now without having to design the 'perfect system' all at once.

See the sections on [learning platforms](#) (p20) and [management information systems](#) (p29) for details of other research/development needs.

When it comes to a managed learning environment we will fight hard to go slower than others – we want a good one to be found. It's important to do MLEs on a big scale so we can share/transfer data. ... It must be fully interoperable with the VLE we already have – it must be a superset of the [name of VLE]. Interview 29 – LA

### Overview

Collaboration is central to Priority 2, and includes working across phases and institutions in education, across sectors (such as education, health and social services) and with parents and employers. A key driver underpinning the need for collaboration was 'Every child matters: Change for children'<sup>54</sup>, which resulted from investigations following the death of Victoria Climbié in 2000. Underpinned by the Children Act 2004, 'Every child matters' sets out a national framework for change, with a key focus on enhancing the communication and integration of services between providers in different sectors, particularly early years settings, schools and the health service.

Priority 2 highlights the importance of lifelong learning and implicit in its vision is that learners should receive support and achieve smooth transitions between the different institutions in which they may be working. Such institutions might include schools, workplaces, libraries, community learning centres and heritage sites. Efficient sharing of data is fundamental to this level of collaboration and requires not only technical interoperability of systems but also common conceptual understandings and frameworks for organising information. E-portfolios, learning platforms and MISs are seen as playing a central role in enabling such collaboration. As our data revealed, mobile technologies such as PDAs can also play an important part, for example in facilitating access to learning (see p63 [Example 13](#)).

While there is no mention of parents in Chapters 5 and 6 of the e-strategy<sup>55</sup>, which set out Priorities 2 and 3 in detail, parents are seen as essential to the enhancement of learning throughout the e-strategy, which includes explicit reference to their role in relation to Priority 2<sup>56</sup>. The key means by which parents are expected to be empowered to play a greater role in children's learning is access to information through learning platforms, e-portfolios and MISs (the key technologies highlighted in Priority 2).

### Implementation and uptake

Cross-sector working was high on the agenda for most of the pre-16 organisations, some of which were in LAs that had started to reorganise their structures to reflect the 'Every child matters' agenda.

However, this was at a very early stage in all cases. The ICT functionalities that respondents to the web questionnaire said they were implementing provided little evidence of cross-sector working. For example, very few respondents (approximately 6% of the 125) were providing access to MIS data for workers from other sectors. A small number of interviewees identified that they were working with their LA's wider IT services in order to align the network and security infrastructures being used by schools and other LA services. However, the overall picture was one of cross-sector working being embryonic, at best.

There was limited evidence of collaboration between pre- and post-16 organisations. This is at odds with evidence from the literature, which suggests that over half of colleges are involved in collaboration with schools<sup>57</sup>. Where such collaboration was evident in our data, it often appeared to involve a college making provision for 'problem' students at local secondary schools.

Collaboration to support the transition of students when they moved between schools, particularly at the end of Key Stage 1 or Key Stage 2, was rarely reported. Where it was taking place, it almost invariably appeared to be focused around ICT as a subject (see p55 [Example 9](#)), though this was often set in the context of a cross-curricular project (see p33 [Example 3](#)). In one instance a learning platform was identified as facilitating the transfer of students and teachers between schools within the area supported by that organisation, because they could still access their work and other resources through the learning platform.

There was less evidence of working across potential learning sites such as libraries and heritage sites. While the responses to the web questionnaire did suggest that over 70% of the respondents' organisations were concerned with settings such as libraries, relatively few were similarly concerned with heritage sites. Fewer than 40% of the 125 respondents to the web questionnaire reported that their organisation's vision included a major focus on responsibility for supporting learning in libraries. For heritage sites this figure was less than 10%. See [panel 10](#) (p35) for more details.

Supporting learning in the home was seen as important: 90% of respondents identified the

As a spin-off from the portal, some services with a lot of workers in the field, who are based in schools rather than County Council offices so they can't access the Council network regularly, are using the portal as a means to communicate. Interview 24 – LA

home as of being of 'some' or 'a lot' of importance within their organisation's vision (see p35 [panel 10](#)). However, only 24% of respondents' organisations viewed parents as being of primary importance in the education of their children, although this did vary across respondent groups (see p36 [panel 11](#)).

Supporting learning in the workplace was seen as being somewhat less important; 65% of respondents identified the workplace as being of some importance or very important within their organisation's vision (see p35 [panel 10](#)). Only 21% of respondents' organisations viewed employers as being of primary importance, although this too varied across respondent groups (see p36 [panel 11](#)).

Table 8 summarises the percentage of organisations that gave parents (or carers and/or other community members) access to learning platforms, digital resources and/or MIS data, and highlights the differences between the pre- and post-16 phases. Overall the data would seem to suggest that most respondents' organisations, even within the pre-16 phase, are not trying to engage actively with parents (or other members of the community) through ICT. This view was supported by the data from the interviews, which indicated that – even in cases where schools were trying to engage more fully with parents – this generally meant giving them more information rather than encouraging two-way communication. There were one or two notable exceptions to this: for example where FE colleges were working closely with employers (see p34 [Example 5](#)) or where schools were engaging parents or grandparents in responding to online questionnaires as part of a history/ICT project (see [Example 3](#)). This seems to confirm the findings from earlier studies – which indicated, for example, that schools were not generally using email as a means of communicating with parents<sup>58</sup>.

**Table 8** Proportions of respondents' organisations giving access to parents and other members of the community

	All respondents (n=125)	Pre-16 (n=52)	Post-16 (n=38)
<b>Learning platform</b>	41%	50%	24%
<b>Digital resources</b>	49%	56%	18%
<b>MIS data</b>	8%	12%	2%

### Example 3 – Using a website and online questionnaire to facilitate transfer between schools

In one LA, learners took part in projects which spanned the final term at one school and the initial term at their next. The projects were managed and supported through a dedicated stand-alone website. So, for example, Year 2 students did a project on seaside holidays of the past which linked into a Year 3 project on weather around the world.

For students moving from Key Stage 2 to Key Stage 3 the transitional projects were linked into Module 7.1 of the Key Stage 3 ICT curriculum (presentation skills) and Module 7.5 (data analysis). Learners began their work in Year 6 and carried it on in the first term of Year 7. These projects involved the learners and their families, since one aim was to compare life for an 11-year-old now with that of an 11-year-old from previous generations. Among other things, this required participants (learners and those they chose as comparators) to complete an online survey. The database generated from these responses had over 2,500 records in it, which provided a rich resource for the data analysis module in Year 7.

There has been a high take up of the system by primary schools in the LA, with around 85% integrating it into their schemes of work. The impact on students' learning was seen as being very positive, both in terms of the feedback they had received from students and also that 'receiving teachers' recognised the high levels of ICT skills that students had at the start of the year, which they could then build upon. However, future funding to support the website looked uncertain.

### Example 4 – Collaboration between a college and local schools

A college described how it was using a VLE to support collaboration with three local secondary schools. Some students from the local secondary schools attended the college for a couple of days a week and needed to access college work at school, and sometimes school work at college. The VLE was developed to facilitate this process, with each of the four organisations developing courses on their area of the VLE.

One of the problems that they had to overcome was finding a mapping between the school curriculum,

When children/teachers move schools, they take the platform and portfolio with them. [name of city] has higher pupil mobility than the national average and so this functionality is particularly useful. Interview 11 – RBC



which the students were required to complete, and the work they did in college. It was important to avoid duplication of work by staff and students, which they found required careful planning and good communication between the schools and the college. They saw the potential to develop resources in the future for use across all four institutions, for example focused on key skills in literacy, communication and ICT.

### Example 5 – Collaboration between an FE college and (small) employers

One FE college described how it was collaborating with employers – particularly small businesses in the areas of beauty, hairdressing and floristry – in order to provide work-based training. The college has created a website for work-based learning linked with the main college site. This provides access to schemes of work with links to relevant e-learning materials. Employers and students are given their own passwords so that they can log in and access the site. Where an employer does not have internet access, the college provides the website content on CD or DVD. College staff who visit the students in their work place can access the schemes of work and associated resources via their laptops.

The design and content of the work-based learning website were developed in collaboration with employers and college staff, including web developers and lecturers. Members of the college team work closely with employers and visit them, particularly when new employers join the scheme. The college collects student and employer feedback on a termly basis, and are finding that employers are becoming more confident and demanding in identifying resources that they feel the site should include.

This approach has enabled small employers who would otherwise struggle to release staff for training to work effectively with the college. One key indicator of the success of the approach is that the number of partner employers in the target subject areas has doubled since the scheme started. The college is finding that participating employers are starting to recommend the scheme to other employers. The success of the scheme has meant that the college is now extending it to other areas such as construction, catering and hospitality.

### Gaps and other problems

Effective collaboration across sectors is still in the early stages of development, although there does appear to be a good deal of activity surrounding the re-organisation of LAs in order to meet the need for more effective cross-sector working. The complexity of the task is highlighted by the difficulties in developing shared understandings even within the education sector (See p82 [Key implementation issues: Shared understandings](#) and p66 [Complexity, change and the e-strategy](#)).

A concern expressed by a number of interviewees related to the safety of younger learners in online spaces. This was identified as a major barrier to providing parents and other members of the community with access to learning platforms, owing to the difficulties of vetting such potential participants appropriately. In order to make spaces safe and secure for young learners, respondents felt that only those adults whose *bona fide* acceptability to work with or near young people could be verified should have access to the site. In general this often meant limiting access to teachers and education professionals. The exception to this might be online spaces which allow parents to have access to data on their own children and/or to work with them. This in turn raised questions for some respondents with reference to the young person's right to privacy – a matter which became increasingly significant as students progressed through the education system. In one case, a commercial supplier reported that teachers of younger children had specifically requested that they be offered spaces apart from older ones; a request to which they felt obliged to acquiesce.

Access to computing equipment and broadband for out-of-school use are still major issues, particularly for certain sectors of the community. A number of different approaches to overcoming these problems were identified, ranging from supplying PCs for home use in the case of one LA, through to ensuring that facilities were available through libraries, heritage sites and other 'public' venues in a number of others. Many of the interviewees recognised that access to ICT facilities represented a serious equity issue and that the digital divide still exists. For those students whose homes are not readily accessible to new technologies, parents may not be able to offer

We would like to be able to work more with parents, but currently can't. The issue is that it must be a safe and secure environment and we have no way of validating the acceptability of any parent: since we can't do this, we have to exclude them. Interview 3 – Other

their children a comparable level of support in terms of either internet access or their collaboration with school projects or homework. It may also be worth noting that it is becoming more usual for homes to use mobile telephones and not have a landline, which clearly complicates further the issues of equity and access. Some parents object on a number of grounds to schools intruding into their domestic lives, while other parents refuse permission for their children to have internet access both at home and in school.

Some respondents were concerned about the need to bear in mind the workload implications for staff of two-way communication between school and parents or homes. They felt it was important to consider the workload implications that such initiatives may have on members of the school's teaching or administrative staff in order for these exchanges to remain manageable and constructively useful to all parties and within the terms and conditions of service of employees.

### Areas for further research/development

The Government's home ICT access schemes<sup>59</sup> highlight the importance placed on overcoming the digital divide. However, further development and research is needed in this area, building on the national review of software licensing and document interoperability in relation to home and school computer use<sup>60</sup>. In particular, further work is needed to:

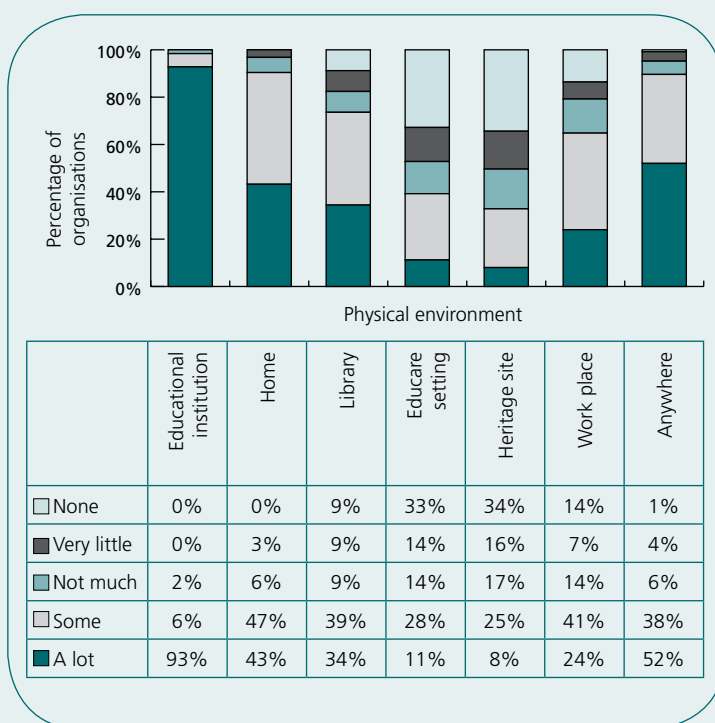
- understand how the changes required to integrate services across sectors can best be implemented. Many of the suggestions for further development and research identified in **Key implementation issues** (p65) are directly relevant.
- understand how to use learning platforms and other ICT facilities effectively to support the needs of learners at different points in their development. Care needs to be taken to avoid assuming that what works for one phase of education will work for other phases. An understanding of these different educational contexts is essential to support collaboration across phases.
- explore ways in which parents, employers and other members of the community can be supported in working more closely with schools and other education providers in order to support

students' learning in ways that are acceptable to all parties. When considering home-school links, as with other aspects of implementing the e-strategy, it is important to have clarity of vision about the intended outcomes.

## 10 Supporting learning in different settings

Respondents to the web questionnaire were asked to indicate the extent to which their organisation's vision included responsibility for supporting learning in a range of different settings. Figure 10.1 gives a summary for all 125 respondents. It clearly shows that they thought educational institutions were the most important settings. Home was seen as being of at least some importance to most organisations' visions. Educare settings and heritage sites were seen as being of at least some importance in less than 40% of cases. This contrasts with 'anywhere the learner might be', which was seen as being almost as important as home. This apparent discrepancy might suggest that respondents equated 'anywhere the learner might be' with 'anywhere the learner has access to the internet'.

**Figure 10.1** Extent to which respondents' organisations' visions include responsibility for supporting learning in different settings

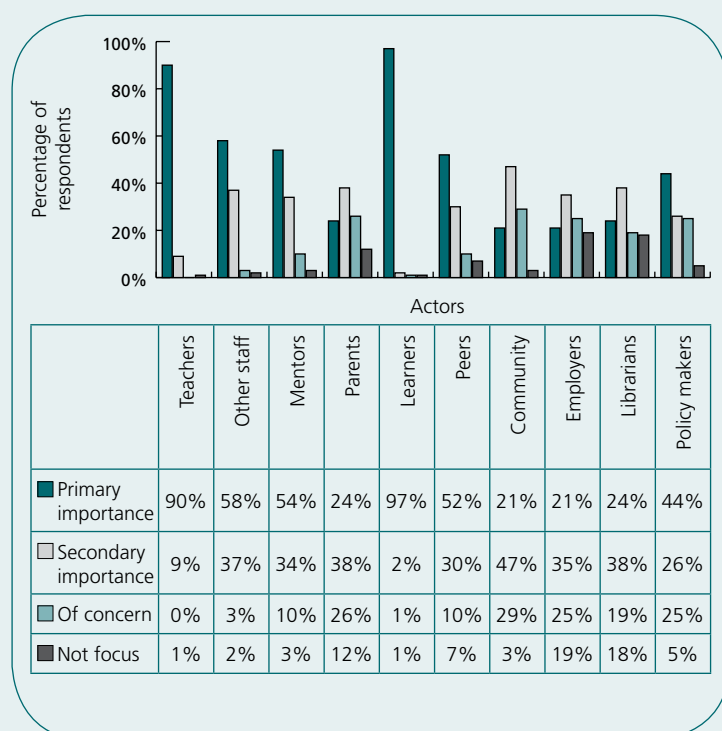


Referred to in *Collaboration: Implementation and uptake* (p32) and *Advice and support (for learners): Implementation and uptake* (p38)

## 11 'Actors'

When asked to rate the relative importance of a range of actors within their organisation's vision, virtually all respondents indicated that they saw learners and teachers as being of primary importance. Other staff, mentors, peers and policy makers were all rated as being of primary importance by between 40% and 60% of respondents. Parents, other members of the community, employers and librarians were all seen as being of less importance. However, across the respondent groups there were some differences, which are highlighted in Table 11.1.

**Figure 11.1** Relative importance of different actors (n=125)



It is perhaps surprising that the commercial and pre-16 respondents rated teachers as being of primary importance less often than the other groups. In the case of the commercial respondents, this may reflect recognition on their part of the complexity of integrating ICT into classroom practice, which means that they focus their efforts on other actors. For the pre-16 organisations the explanation is less obvious.

There seems to be a mismatch between the drive in the e-strategy to increase the involvement of parents and their relative priority across the respondents' organisations. While it is not surprising that the post-16 organisations place least importance on parents, the apparently low priority of parents as participants in supporting learning for the pre-16 organisations must be a concern.

**Table 11.1** Key differences between specific respondent groups and the respondents as a whole in rating different actors as being of primary importance to the organisation's vision

	Rated as primary importance		
	Less often (than respondents as a whole)	Respondents as a whole	More often (than respondents as a whole)
<b>Teachers</b>	Commercial 70% Pre-16 88%	90%	RBC 100% Post-16 and Other 95%
<b>Other staff</b>	Commercial 40%	58%	Other 75%
<b>Mentors</b>	Commercial 40% Pre-16 38%	54%	Other 75% Post-16 66%
<b>Parents</b>	Post-16 3%	24%	RBC 60% Other 45% Commercial 30% Pre-16 27%
<b>Learners</b>	Post-16 95% Commercial 90%	97%	RBC and Other 100% Pre-16 98%
<b>Peers</b>	Post-16 37%	52%	Other 70%
<b>Members of the community</b>	Post-16 8% Commercial 10%	21%	RBC 40%
<b>Employers</b>	Pre-16 10% Commercial 10%	21%	Post-16 39%
<b>Librarians</b>	Commercial 0% Other 10%	24%	Post-16 50% RBC 40%
<b>Policy makers</b>		44%	RBC 80%

Similarly, the relative importance of employers, librarians, and other members of the community was low across the respondents as a whole. Perhaps not surprisingly, the post-16 organisations rated librarians and employers as being of primary importance more often than other groups of respondents.

*We don't pretend teachers have the time to be interested in such things. And the method does seem to work. We are not changing the curriculum or how teachers teach ... The evidence is fairly strong that using [name of system] is benefiting students and does not add extra work for teachers.*

*Interview 35 – Commercial*

Referred to in Collaboration: Implementation and uptake (p32) and Advice and support (for learners): Implementation and uptake (p38)

The high schools are getting direct data transfer from feeder schools at present just for ICT, but the system is set up for any subject. When pupils start at high school they are using the same system and the teachers can see the whole portfolio and are not just getting a grade score. The value indicator here is that the high school is footing the bill for its primary schools.

Interview 21 – LA

The school-wide network has filtering systems and pupil accounts have the same filtering, but our aim is to work across all the city services such as museums, youth clubs and libraries so that no learner will ever be more than a few hundred yards away from a high-quality internet access point. We already have a single log-on for schools but are working on single log-on for every setting.

Interview 22 – LA

The digital divide is in every country – not between countries – it is in every country and is really serious.

Interview 33 – Other

We need to support schools and parents. We run parent-and-pupil courses to find out what is different at school/home. Parents need more support knowing how to help their youngster's use of the internet, and about copyright, cheating, etc.

Interview 29 – LA

[Our aims are] To allow teachers and parents to have online access to the information, we need to support learning whenever and wherever they need it. To enable data on children to be accessible to the appropriate authorities so that we can address the 'Every child matters' agenda... To bring all these systems together and create a coherent network of information and support for the whole borough...

Web questionnaire 45 – LA

The intention was to give parents access to the web spaces. There is a technical problem with [name of VLE] in as much as it is not possible to provide limited access to the same resources/spaces for a second password holder. Given that pupils are the current password holders, parental access needs to be 'granted' by the pupils by sharing their password. Some children do; some don't. Those that don't seem concerned that their parents will see them making mistakes, struggling etc and may want to intervene in ways the children want to do without. The corollary seems to be that parents have no automatic right of access to physical classroom spaces, so why should they have a right to access virtual classroom spaces. Thus the aim of achieving parental involvement is not as simple as it seems; it is a nexus of technical, legal and social issues.

Interview 41 – School

[Our aims are] ... Sub-regional regeneration through education (fully supported by all aspects of ICT – e-learning, infrastructures, e-skills for teachers, learners, employees, citizens, support staff) ... Learner-centred learning – improved attainment – improved/informed life choices. Workforce remodelling – improved recruitment, retention, job satisfaction... Multi-agency working – no longer LEA but have moved to Children and Young People's Service (education, health and social etc together). Parity of experience for all citizens...

Web questionnaire 37 – LA

The VLE has helped to establish parental links. There is a sign-in for parents, with generic log-in, where they can see their children's lesson plans, main learning objectives and homework. And parents have found that invaluable – in terms of hits, parents are going in regularly even if just to check up on homework.

Interview 31 – LA

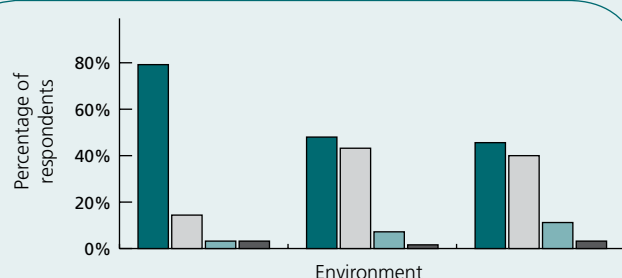
## Overview

Priority 2 envisages just-in-time advice and support being available to children and learners online. **The eSIR reference statement** (Appendix 1 pi) identifies such support as needing to span the full range of the curriculum and all aspects of learning across both physical and virtual spaces, and at times when it is needed by learners. It recognises that, for younger learners, support probably needs to be face to face and that, as they develop, online support will play an increasingly important role.

## 12 The environment

Respondents were asked to rate the relative importance within their organisation's vision of the spatial and temporal environment. Figure 12.1 shows that physical presence (such as face-to-face teaching, support and collaboration) was seen as being more important than either learning/support at a distance (for example via email or through a virtual presence or web space) or support for learning outside the 'normal' school/college hours (24/7/365 support, for instance). However, over 40% of all respondents regarded extending the spatial and temporal environment as being of primary importance to their organisation's vision.

**Figure 12.1** Relative importance within organisations' visions of different environments (n=125)



	Physical presence	Learning at a distance	24/7/365 support
Primary importance	79%	48%	46%
Secondary importance	14%	43%	40%
Of concern	3%	7%	11%
Not focus	3%	2%	3%

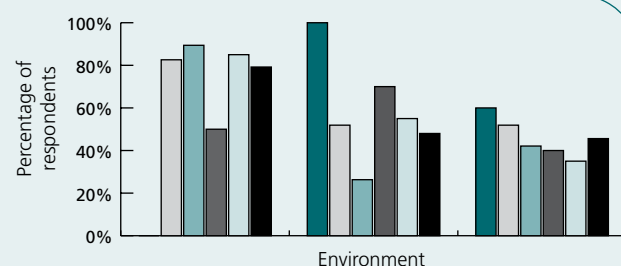
## Implementation and uptake

The web questionnaire explored three aspects of support: where support should be provided; who the key actors were in organisations' visions; and what forms of support were considered most important.

While face-to-face support was seen as being more important than either support at a distance or support for learning outside the normal school/college hours, over 40% of respondents thought that learning at a distance and '24/7/365' support were of primary

There were important differences across the respondent groups (see Figure 12.2). The RBCs placed much less importance on physical presence and much more importance on learning/support at a distance than any other respondent group. This might reflect their remit of providing internet access for schools, but does suggest a major push to extend where learning takes place. Half the respondents from the commercial group did not rate physical presence as being of primary importance and placed correspondingly greater importance on learning/support at a distance. Perhaps surprisingly, the post-16 respondents were the least likely to identify learning/support at a distance as being of primary importance.

**Figure 12.2** Environments seen as being of primary importance, by sector



	Physical presence	Learning at a distance	24/7/365 support
RBC (n=5)	0%	100%	60%
Pre-16 (n=52)	83%	52%	52%
Post-16 (n=38)	89%	26%	42%
Commercial (n=10)	50%	70%	40%
Other (n=20)	85%	55%	35%
All (n=125)	79%	48%	46%

The differences across groups in relation to the temporal environment were minor by comparison, suggesting much greater agreement across respondent groups about this aspect of their visions.

Referred to in *Advice and support (for learners): Implementation and uptake* (p38) and

Opening up access: *Implementation and uptake* (p63)



importance, and over 80% thought that they were of primary and/or secondary importance (see [panel 12](#)). The educational institution was overwhelmingly seen as the most important setting in which support for learning should be provided. Home and also anywhere the learner might be were both seen as being of some importance or very important to the vision of most respondents' organisations, though other physical settings (such as heritage sites, libraries and work places) were not considered so important (for further details see p32 [collaboration](#) and p35 [panel 10](#)).

Most respondents' organisations were implementing anywhere/anytime access to a learning platform (see p20 [Learning platforms](#)) which provided content and tools outside school/college time. In addition, the data from one commercial interviewee, which was corroborated by two interviewees from LAs, indicated that the majority of secondary schools and a growing number of primary schools provide access to online revision materials for students from third-party suppliers. However, there was little evidence of either synchronous or asynchronous advice from adults being provided outside school/college times, except in the case of two interviews.

Perhaps not surprisingly, our 125 respondents regarded learners (97%) and teachers (90%) as being the actors of primary importance, followed by other staff (58%), mentors (54%) and peers (52%). Perhaps surprisingly, respondents considered parents, other members of the community, employers and librarians to be of less importance (for more detail see [Collaboration](#) and p36 [panel 11](#)).

Most of the respondents referred to aspects of support for learning: they often mentioned not only the transformation of learning and teaching, but also the importance of collaboration, independent learning, personalisation, learner engagement, learner responsibility and learner control. When asked specifically about the relative importance of a range of forms of support for learning, at least 80% of respondents identified that teaching (helping learners to learn something specific) and supporting learners in taking responsibility for their own learning were vital. Providing tools and content to support learners was seen as the next most important form of support (see p40 [panel 13](#)).

### Example 6 – Developing a collaborative learning community

One LA respondent described how the LA has been running a learning platform, which it is developing as a collaborative learning community. The system provides a personalised work space for 14–19-year-olds, with support for learning opportunities wherever they are, and within communities of learners. The learning platform is available in about 60 schools in the area, but managed by an external contractor. It is intended to extend beyond school rather than replicating what schools do. One of its aims is to change practices by creating a learning community where learners can communicate and collaborate. A team of mentors is available online every day (including holidays) from 8am to 8pm.

A key focus, at least initially, has been on supporting dialogue between learners. Of the 21,000 learners on the learning platform, the LA estimates that roughly 50% regularly engage in discussion, much of which is of a social nature and takes place outside school time. At the time of the interview, the most active of the discussion areas was 'religion and spirituality'.

There are champions in the schools (including headteachers) who are helping to promote the learning platform, for example by challenging every secondary school department to create one assignment per term using the system. The schools are using the learning platform to varying degrees, with some teachers developing highly effective practice. A number of teachers have been very keen and are active users of the system and contributors to the discussions. For example, in one school the science department is using the communication forums to challenge students' thinking via an open community-focused dialogue in chemistry, to which the chemistry teacher also contributes. Another school is seeing tangible benefits from using the learning platform to support students on young apprenticeships, whom they had found it difficult to support in the past.

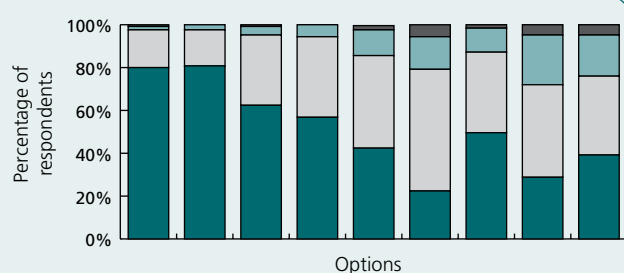
In reflecting on progress, the project champion felt they had not only assumed that schools and teachers were more ready than they were, but also underestimated what it meant to engage in a project like this. To use the collaborative learning



### 13 Modes of support

The questionnaire asked about the relative importance of a number of different forms of support for learning within the vision of respondents' organisations. The majority of respondents (81% and 80% respectively) saw as vital both teaching (helping learners to learn) and supporting learners in taking responsibility for their own learning. Providing tools for learners to use (things like scientific equipment or multimedia authoring software) and providing content for learners to use (books or digital resources, for example) were third and fourth in terms of the numbers of respondents who identified them as being vital within their organisations' vision (62% and 57% respectively). This pattern of response was very similar when vital and very important responses were considered together: teaching (98%), learner responsibility (98%), tools (95%) and content (94%).

**Figure 13.1** Relative importance of different forms of support for learning (n=125)



	Teaching	Learner responsibility	Tools	Content	Formative assessment	Summative assessment	Personalised support	Mentoring	Learner choice
Neither here nor there	1%	0%	1%	0%	2%	6%	2%	5%	5%
Important	2%	2%	4%	6%	12%	15%	11%	23%	19%
Very important	18%	17%	33%	38%	43%	57%	38%	43%	37%
Vital	80%	81%	62%	57%	42%	22%	50%	29%	39%

Perhaps surprisingly, given the emphasis placed on differentiation and personalisation in education, providing personalised support and allowing the learner to choose the form of support they want (which might change over time) were not within the top four options. Indeed learner choice appears to be seen as less important than all the other forms of support except providing support for all aspects of mentoring.

Referred to in Advice and support (for learners):  
Implementation and uptake

communities successfully, the schools needed to change what they were doing, and replace previous activities with new ones that made good use of the collaboration and communication facilities of the learning platform. However, a number of schools blocked the chat and/or email facilities, which undermined the effectiveness of the system. A key issue is how to use the technology children want to use as part of their learning process in a way that does not undermine the teaching process in the school. So, for example, they are considering scheduling chat that allows flexibility of collaboration and communication, but does not affect classroom or school practice.

#### Gaps and other problems

The provision of mentoring and other forms of online advice, other than in the form of materials, is an area that is being explored by a small number of educational organisations. The provision of such support raises difficult issues, for example relating to funding models and the integration of the roles of teachers and other school staff with online mentors. See [New pedagogy](#) (p51) and [Key implementation issues: Buy-in](#) (p74) for further discussion of this area.

#### Areas for further research/development

The most effective models for providing online support and advice for learners need to be explored, taking into account the interrelationships between such provision and traditional school- and college-based ways of working.

## Overview

Assistive technologies are seen in Priority 2 as one facet of the support that should be provided to ensure universal access to education. This emphasis on equality of opportunity is underpinned by the Disability Discrimination Act, which places duties on education providers (and others) to take reasonable steps to meet the needs of people who have disabilities (see [panel 14](#) for more details).

## Implementation and uptake

In the context of current legislation on disability discrimination, it is perhaps a little disconcerting to note that only 57% of respondents to the eSIR questionnaire said that their organisations were implementing assistive technologies, with 27% saying that they had no intention of doing so. This compares with data from a recent Becta study<sup>61</sup> which shows that schools taking part in that survey had low numbers of workstations configured to meet the needs of individual users (for example an average of 0.58 workstations per primary school and 2.3 workstations per secondary school having bespoke operating-system configuration) and equally low numbers of physical, sensory or cognitive technology devices (an average of 0.8 assistive technology devices per primary school, for instance, and 1.1 devices per secondary school).

There were noticeable differences between the pre- and post-16 responses – with 35% of pre-16 organisations compared with 5% of post-16 ones apparently having no plans to implement assistive technologies. These figures seem to indicate that the provision of assistive technologies is not a high priority for many respondents' organisations. This reflects the data from the dICTatEd questionnaire (see p42 [panel 15](#)) which shows that less than 10% of respondents rate providing access to the curriculum for those who might otherwise be excluded from it as one of their top three rationales for using ICT in education<sup>62</sup>.

### Example 7 – Using assistive technologies to provide access to learning

One interviewee described how her unit worked with students, schools, colleges and universities, putting effective assistive technologies in place so that students could function comfortably in fully inclusive settings. The unit works with young people, 70% of whom have specific learning difficulties

(often associated with literacy issues) and attention impairments, while the other 30% have a range of issues relating to dexterity, mobility, speech and hearing. A major focus of the unit's work is providing laptops with text-reading technology and voice-to-text systems, alongside teaching strategies for study and internet use, and effective time-management skills. Much of the emphasis of this activity is on training teachers how to support learners who are using assistive technologies.

## 14 Disability Discrimination Act

(Adapted from The Open University (2005) *Supporting open learners – Disability Discrimination Act*)

New legislation introduced in 2002 – the Disability Discrimination Act, Part 4 – places duties on educational institutions to 'make reasonable adjustments' to ensure that students are not disadvantaged because of disability. 'Reasonable' is defined in terms of whether a particular adjustment:

- is consistent with the academic standards and prescribed outcomes of the relevant activity, course or award to which the course counts
- can be afforded by the institution
- can be paid for by the students themselves
- is practical
- does not adversely affect the interests and needs of other students
- is consistent with health and safety legislation.

Since September 2005, education providers must also ensure that all their buildings and facilities are physically accessible to students who have disabilities.

### The Disability Discrimination Act 2005

Further amendments to the Disability Discrimination Act have resulted in the Disability Discrimination Act 2005. A Disability Equality Duty will require every public sector institution to actively promote disability equality from December 2006 by having due regard when carrying out its functions to:

- eliminate discrimination that is unlawful under the Act
- eliminate harassment that is unlawful under the Act
- promote equality of opportunity between disabled persons and other persons
- take steps to take account of disabled persons' disabilities, even where that involves treating disabled persons more favourably than other persons.

Referred to in Support for assistive technologies: Overview

## 15 dICTatEd

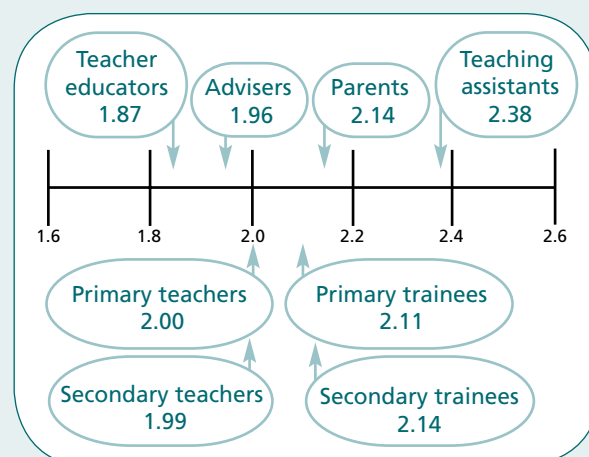
In 2003 the dICTatEd (Discussing ICT, Aspirations and Targets for Education) project [<http://www.meD8.info/dictated>] identified 19 different rationales for using ICT in education (see Table 15.1). The existence of such a large number of different rationales suggests a lack of common shared vision. Data from a web questionnaire [<http://www.meD8.info/qqa>], which asks respondents to rate and rank the relative importance of each of these 19 rationales, confirms this lack of shared vision about the use of ICT in education (Twining 2003a; Twining 2004).

This diffused understanding of a vision for why we should be using ICT in education is also found within the more homogenous group of 'education professionals' (Fox and Twining 2006). For example, Figure 15.1 shows the mean ratings by different groups of respondents for Rationale 15, (the most frequently cited rationale: the only one whose overall mean exceeded 2). Notwithstanding its overall popularity, many of the 'education professional' groups rated it differently. This difference between respondents was even more marked for some of the other rationales.

**Table 15.1** Summary of the 19 rationales for using ICT in education (adapted from Twining 2003b pp5–7)

1	In order to learn IT skills
2	As a tool to achieve traditional teaching and learning goals across the curriculum
2	In order to extend and enrich learning across the curriculum
4	In order to motivate learners
5	As a catalyst for educational change
6	Because of the impact of ICT on the nature of knowledge
7	In order to fundamentally change teaching and learning
8	As a tool to support learners in thinking about their own learning
9	In order to provide access to the curriculum for those who might otherwise be excluded from it
10	In order to increase productivity in education
11	In order to reduce the cost of education
12	In order to make education more efficient
13	As a substitute for teachers
14	In order to reward learners
15	As preparation for living in a society that is permeated with technology
16	As preparation for work (employment)
17	In order to support and stimulate the country's economic development
18	In order to impress stakeholders (for instance inspectors, funders, prospective parents/students)
19	In order to reduce inequalities between students/pupils with differential access to ICT outside formal education

**Figure 15.1** Distribution of mean ratings by different groups of respondents for Rationale 15 (overall mean = 2.06, range of means = 0.52) (Fox and Twining 2006)



Role	n=	Mean rating
Teacher educators	151	1.87
Advisers	192	1.96
Secondary teachers	442	1.99
Primary teachers	210	2.00
Primary trainees	485	2.11
Parents	237	2.14
Secondary trainees	385	2.14
Teaching assistants	64	2.38

The data from dICTatEd does seem to indicate that those working in education do not have a shared vision underpinning the use of ICT. It seems likely that this at least partially explains the lack of impact of investments in educational ICT.

Referred to in Support for assistive technologies: Implementation and uptake (p41);

New pedagogy: Areas for further research/development (p53); and

Key implementation issues: Shared understandings (p82)

The interviewee reported particular success where assistive technologies have opened up access to learning by reducing the emphasis on learning to read and write (because the computer can read and write for you), while increasing the emphasis on comprehension, analytical skills and effective communication. One of their key indicators of success is the huge saving in funding required to support learners over a ten-year period if they can overcome their learning problems by providing appropriate technology and training at an early stage.

### Gaps and other problems

The low priority given to assistive technologies might indicate a lack of understanding of the disability discrimination legislation and of educational organisations' responsibilities to make appropriate provision for learners with disabilities. This reflects the findings of a recent study<sup>63</sup> that included a survey of 2,411 teachers in Michigan (USA), which found that 34% of teachers reported having no knowledge of assistive technologies, with a further 43% saying that their knowledge was minimal. Even among those organisations specialising in the use of assistive technologies, there appear to be problems with staff development: a recent report from the Foundation for Assistive Technologies (FAST) concluded that 'there is a significant problem throughout education, training and continuing professional development process for many AT professionals'<sup>64</sup>.

### Areas for further research/development

Further work is needed to investigate the ways in which new technologies can support learners. This should include looking at how the lessons learnt from work with disabled learners might be applied to enhance the learning of others who are not perceived as being disabled.

We have seen dramatic successes [using mobile devices], most impressively at the university level where students with tested reading capabilities in the first- through fifth-grade levels have succeeded in university coursework. We also see dramatic 'lifestyle' improvements, especially through easy-to-carry devices such as PDAs and reading pens (among students who cannot, for example, read a job application). The accompanying motivational impact is huge. Students, once content is available to them through digital text readers, have a reason to attend secondary school and university-level classes, and can see a much wider range of employment possibilities in their future. (Interview 10 – Special)

### Overview

Mobile devices such as PDAs, laptops and Tablet PCs have the potential to make a substantial contribution to the implementation of the e-strategy, particularly when used in conjunction with wireless networks/ internet access<sup>65</sup>. This is at least in part because they enable the technology to be available when and where the learner needs it. Mobile devices have the potential to enable learning to become 'more situated, personal, collaborative and lifelong'<sup>66</sup>.

### Implementation and uptake

Respondents to the questionnaire identified whether their organisations were providing, or planning to provide, a number of mobile devices. Figure 4 summarises the responses.

**Figure 4** Provision of mobile devices (n=125)

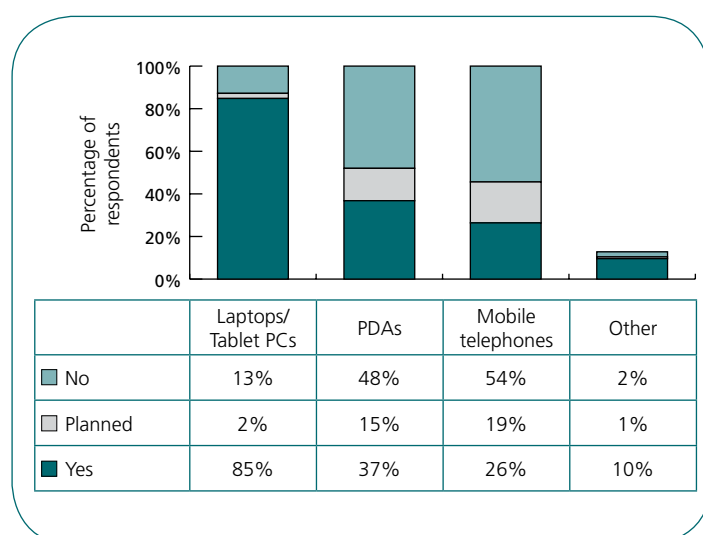


Figure 4 seems to indicate that mobile technologies play a substantial role in meeting organisations' visions in our sample. Respondents were also asked to indicate the extent to which their organisations were providing 'laptops for all' (where laptops could mean laptops, Tablet PCs, PDAs, mobile phones or other user devices). Table 9 summarises the proportions of respondents who said that their organisations have achieved or are working towards 'laptops for all' for different categories of staff. There were substantial differences between the pre-16 and post-16 phases, which are highlighted in Table 10.

**Table 9** Proportions of respondents' organisations providing mobile devices for all staff/students (n=125)

	Teachers	Other staff	Students
<b>Achieved</b>	23%	5%	2%
<b>Working towards</b>	44%	42%	32%
<b>Not working towards</b>	33%	53%	66%

**Table 10** Proportions of pre- and post-16 organisations not working towards providing mobile devices for all staff/students

	Teachers	Other staff	Students
<b>Pre-16 (n=52)</b>	10%	35%	50%
<b>Post-16 (n=38)</b>	55%	74%	89%

Our data indicates that 8% of post-16 organisations have achieved 'laptops for all' staff. This corresponds with data from a recent Becta survey<sup>67</sup>, which showed that only 24% of FE and sixth-form colleges had achieved designated computers, of which 24% were laptops, for teaching staff. The same Becta study<sup>68</sup> showed that 45% of the post-16 organisations did not view providing teaching staff with a designated computer as a priority, which corresponds reasonably closely with our figure of 55% not working towards laptops for all teaching staff.

Mobile phone use was more prevalent in post-16 organisations (37%) than in pre-16 ones (13%) in our sample. However, this differential looks likely to decline as 23% of pre-16 organisations said they were planning to implement the use of mobile phones, compared with 11% of post-16 ones.

The interviews indicated that where mobile devices were being used by students in the post-16 sector, activities tended to be small scale and linked to work-based learning or to providing access for groups who otherwise might be excluded from education. This sometimes involved the use of storage media such as



flash drives/memory sticks and CD-ROMs rather than mobile computing devices.

In the pre-16 sector, mobile devices were also often implemented on a small scale and targeted at specific groups of students (underachievers, for example). This reflects data from Becta<sup>69</sup> which shows that in 2005 over 90% of primary schools had fewer than 21 government/LA-funded laptops, compared with around 30% of secondary schools. The Becta<sup>70</sup> data shows that around 3% of secondary schools had 101 or more government/LA-funded laptops in 2005. While these figures should underestimate the numbers of laptops available because they do not include laptops funded by the schools themselves, another Becta-funded survey found that in 2005 primary schools had an average of 12 laptops available in 2005, and secondary schools had an average of 75<sup>71</sup>. The Becta survey<sup>72</sup> indicated that the average numbers of school-funded PDAs/smartphones were 0.2 for primary schools and 3.0 for secondary schools.

In our sample there were a small number of LAs that were providing mobile devices on a much larger scale; in one case this involved working towards providing all 40,000 teachers and learners with a PDA within five or six years. This reflects the findings in Futurelab's review of the literature on mobile devices, which notes: 'Learning and teaching with mobile technologies is beginning to make a breakthrough from small-scale pilots to institution-wide implementations.'<sup>73</sup>

Where mobile devices were being used by staff in both pre- and post-16 organisations in our sample, this was generally linked with administrative tasks such as registration, or with use in conjunction with a data projector. Where mobile devices were being provided, they appeared to be very popular with learners and teachers. The issue here was not lack of uptake, but problems with providing the numbers of devices that users wanted, alongside concerns about support and various limitations of the available technologies themselves (see p47 **Gaps and other problems**).

### Example 8 – PDAs for all

One interviewee described their LA's plans to provide PDAs for all learners and teachers by 2012 as a move towards an active learner-focused model in

which student research and collaboration are key components. Originally their interest in mobile devices was stimulated by the results of a survey of 200 learners with experience of using the LA's learning platform. Respondents complained of lack of access to computing facilities, the need to get permission to use the facilities and the requirement to share devices. PDAs were seen as 'individual, anytime/anywhere devices which empowered learners rather than placed organisational and other restrictions on them' and which learners were highly motivated to use.

The LA therefore set up a pilot project in 2003 which involved providing PDAs to around 500 learners and their teachers. In the pilot the learners were strongly motivated to use the PDAs, often asking for even higher levels of use than originally planned. Learners showed a responsible attitude towards the equipment, which was a powerful tool when used appropriately. A major finding was that the results were best when learners used the technology in most lessons for part of the time rather than in a few lessons all of the time. They see this as a key measure of the extent to which the technology is embedded. Cross-curricular approaches appeared to be more conducive to effective embedding of the PDAs.

There was greater variation in the reaction from teachers, with some staff making very effective use of the PDAs, while others were more reticent. A key factor was the extent to which teachers were willing to adopt a cross-curricular approach as opposed to one that was subject focused.

Technical issues encountered related to limitations with some PDAs that had restricted functionality, such as the inability to run Flash. There were also some problems with the robustness of the PDAs – especially their screens. It was essential for broken devices to be replaced quickly so that learner motivation and credibility in the eyes of teachers did not evaporate. This required a 'hot swap' system to be in place.

Perhaps surprisingly, the cost of providing PDAs for all the learners in the LA was not seen as a major issue. They felt that a combination of available grants, industry support (related to the scale of purchases) and parental contributions would be sufficient to complete the project.

I've always banged on about laptops for teachers – that is the single most important mind-changing thing – they need ownership. Similarly, children having their own equipment is vital – what is going on at home makes a nonsense of what we are doing in schools. ... Realistically, mobile technology for learners is the only way to create a step change – a tipping point. Interview 33 – Other



## 16 – Benefits of ownership of mobile devices

In the early 1990s Watson (1991) argued that providing staff with laptops would make a big difference to their use of ICT in schools. This view is strongly supported in the literature, where there is clear evidence that 'the best way to increase teachers' ICT skills is to give them a personal computer'. (Somekh *et al* 2002 p32). This view was confirmed by both the first and second evaluations of the Laptops for Teachers initiative (Becta 2001; Becta 2002; Kington *et al* 2003), which found that – although at first those allocated laptops, when these were a 'scarce resource', felt under pressure to justify their ownership – the benefits were considerable. These included teachers reporting how valuable having your own machine was for teaching, administration, management, record keeping, finding and creating resources of a high professional standard and maximising the value of shared planning. Most teachers felt that ownership had reduced their workload in supporting learning and in management, as well as increasing substantially their confidence and competence in using ICT and incorporating it into their teaching. In some contexts staff ownership of a mobile device enhances the professional status of teachers (Leach *et al* 2004) and/or their feeling of professionalism (Twining *et al* 2005). It also enhances their perception that ICT is part of their professional role (Fairfax County Public Schools 2003). Hammond *et al* (2005) similarly argued that student teachers obtained maximum value from Tablet PCs when they had ownership of them.

The PLAIT project (NCET 1993) identified that supplying students with laptops had considerable benefits. This view has consistent support in the literature; Naismith *et al* (2004), in their review of the literature on mobile devices, concluded that learning in school or college is most effectively supported when each student has access to a mobile computer. However, there is some disagreement in the literature about whether students should be allowed to take mobile devices home. Some express concerns about lost or damaged equipment (for example Fouts and Stuen 1997), while others provide evidence to show that these fears are unfounded (for instance Vahey and Crawford 2003).

A number of recent reports have identified a range of benefits of student ownership of their own mobile device (for example Perry 2003, Twining *et al* 2005). For students these include a sense of belonging with the device and personal commitment and comfort, increased motivation and engagement, reduction in absence from school, improvement in behaviour and an increase in concentration and time on task. When students have individual ownership, the evidence is that they make greater use of the machines to support their learning: that is they use them often, in a wider range of learning domains and at home as well as in school. On the other hand, machines held and issued by teachers remain idle for a higher percentage of time. This view was endorsed by Twining *et al* (2005 p4), who noted that:

'Where students were sharing a Tablet PC, the amount of time they spent using it was significantly less (often around 10% of the available time) than in those cases where the students 'owned' a Tablet PC (where estimates of use varied from 25% to 75% of the available time). It appeared that in most of the schools where the Tablet PCs were shared, these were not in use for much of the time, either because they had not been booked or because significant sections of the lessons where they were scheduled to be used involved whole-class teaching.'

Personal ownership does, however, change the roles and relationships within the classroom, for example reducing the institutional control of the technology (Savill-Smith and Kent 2003).

One disadvantage of the individual ownership model that has been noted is that it is more difficult for teachers to pre-install and update teaching materials directly onto the machines than if these were all centrally held. With the increasing use of individual student work areas on school servers accessible from home, this clearly becomes less of an issue, as students should be able to access whatever they need for themselves, apart possibly from the very youngest users. Twining *et al* (2005) also commented that in schools where pupils had ownership of the device the speed and imaginative ways they learned to use them, the growth in their confidence and ICT skills, and the reduction in time spent saving and printing out notes was noticeable.

In the USA a number of initiatives have been put in place to offer ownership of laptops to entire cohorts of learners, some of which are part of the 'No child left behind' agenda for 'scientifically-based research'. Although there is some feeling that it is too early to produce comprehensive evidence of positive gains, so far reports are seen as positive and encouraging and include increased student gains in subject tests, improved attendance, decline in discipline problems and higher levels of motivation and engagement with learning (see Muir 2004; Fouts and Stuen 1997; The George Lucas Educational Foundation 2002; Brown 2001).

*... Mobile technologies seem to have huge potential but somehow this doesn't get crystallised, and the initiatives seem to stay at the pilot stage despite their promise [talking about the EU context] ...*

*(Interview 48 – Other)*

*More computers for staff – give everyone a laptop, including part-time staff. Don't make them buy or borrow them. Make the laptop wireless or plug into the network.*

*(Interview 32 – FE)*

Referred to in Mobile devices: Gaps and other problems (p47) and Key implementation issues: Focus on people (p70)

### Gaps and other problems

Personal ownership of mobile devices has been seen to be particularly effective in enhancing successful embedding of ICT (see p46 [panel 16](#)). Despite this potential, 'laptops for all' is only a reality for very small proportions of staff and students. This seems likely to be due in part to the fact that while different types of mobile devices meet different educational circumstances, each of them suffers from a number of limitations. For example, for PDAs the size and/or durability of their screens were seen as issues (see Interview 2 – FE; Interview 25 – LA); while for Tablet PCs the cost and short battery life have been found to be problematic<sup>74</sup>. The perceived short lifespan of mobile devices, due in part to the speed of technological development, was also seen as an inhibiting factor.

### Areas for further research/development

Further work is needed to define and develop the range of mobile devices to support learning. In addition, in-depth longitudinal studies are needed to further our understanding of the most effective ways of embedding mobile devices in order to enhance learning. This should include research into:

- the importance (or otherwise) of personal ownership
- the extent to which mobile devices can enhance home-school links.

Change in technology is also rapid, particularly in the mobile computing arena, and this causes support problems, shortness of working life of devices, problems of keeping up etc.  
Interview 36 – LA

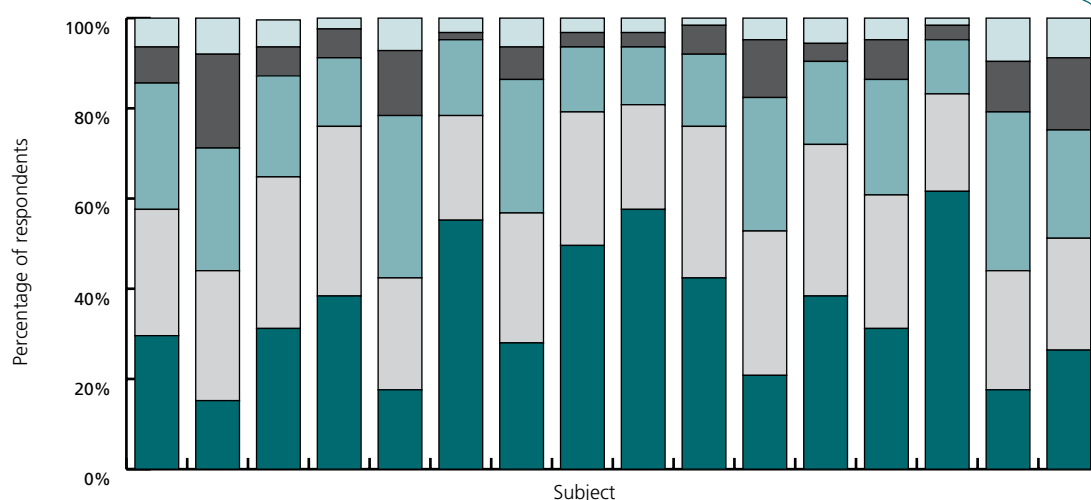
### Overview

The focus of the e-strategy is on transforming learning through embedding ICT across the education system. Priority 3 is about ICT as a tool to support learning, teaching and assessment across the curriculum, rather than as a subject in its own right. Priority 3 places an emphasis on extending the curriculum to include the skills needed in the knowledge-based economy. The e-strategy sees ICT as not only having changed the curriculum that learners need to engage with, but also providing opportunities for supporting the development of skills (and understanding) because ICT is an interactive medium.

### Implementation and uptake

While the vision of most organisations (for this group of respondents) included a core curriculum as well as an element of choice for learners, the relative importance of different subjects, and thus what the core curriculum should include, was less consistent. Figure 5 and Table 11 show that there was a cluster of subjects that were consistently rated as being important, very important or vital by 90% or more of respondents. This group consisted of communication skills (95%), critical thinking skills (90%), information handling (92%), ICT (94%), learning to learn (94%), literacy and numeracy (95%) and problem solving (91%).

**Figure 5** Relative importance of different subjects (n=125)



	Vocational studies	Sport science/PE	Science	Problem solving	MFL	Literacy & numeracy	Life skills	Learning to learn	ICT	Information handling	Humanities	Critical thinking skills	Creative/media studies	Communication skills	Citizenship	Business studies
Irrelevant	6%	8%	6%	2%	7%	3%	6%	3%	3%	2%	5%	6%	5%	2%	10%	9%
Neither here nor there	8%	21%	6%	6%	14%	2%	7%	3%	3%	6%	13%	4%	9%	3%	11%	16%
Important	28%	27%	22%	15%	36%	17%	30%	14%	13%	16%	30%	18%	26%	12%	35%	24%
Very important	28%	29%	34%	38%	25%	23%	29%	30%	23%	34%	32%	34%	30%	22%	26%	25%
Vital	30%	15%	31%	38%	18%	55%	28%	50%	58%	42%	21%	38%	31%	62%	18%	26%

Communication skills (62%), ICT (58%), literacy and numeracy (55%) and learning to learn (50%) were all rated as being vital by 50% or more of respondents. The next cluster of subjects that were most often rated as important, very important or vital consisted of science (87%), life skills (86%) and creative and/or media studies (86%).

**Table 11** Percentage of respondents rating each subject as important, very important and/or vital (n=125)

Vital		Very important or vital		Important, very important or vital	
Communication skills	62%	Communication skills	83%	Communication skills	95%
Literacy and numeracy	55%	ICT	81%	Literacy and numeracy	95%
ICT	58%	Learning to learn	79%	ICT	94%
Learning to learn	50%	Literacy and numeracy	78%	Learning to learn	94%
Information handling	42%	Information handling	76%	Information handling	92%
Problem solving	38%	Problem solving	76%	Problem solving	91%
Critical thinking skills	38%	Critical thinking skills	72%	Critical thinking skills	90%
Science	31%	Science	65%	Science	87%
Creative/media studies	31%	Creative/media studies	61%	Creative/media studies	86%
Vocational studies	30%	Life skills	57%	Life skills	86%
Life skills	28%	Vocational studies	58%	Vocational studies	86%
Business studies	26%	Humanities	53%	Humanities	82%
Humanities	21%	Business studies	51%	Citizenship	79%
Citizenship	18%	Citizenship	44%	MFL	78%
MFL	18%	MFL	42%	Business studies	75%
Sports science/PE	15%	Sports science/PE	44%	Sports science/PE	71%

There did appear to be general agreement about the importance of what might be described as 'information age' skills, which reflect the support in the literature for the need to revise the curriculum (and assessment) in order to meet the needs of individuals and society in the 21st century<sup>75</sup>. However, there were some differences between the groups of respondents, which are explored in more detail in [panel 17](#) (p50).

### Examples

Perhaps not surprisingly, in the context of externally specified curricula and assessment being a key vehicle for holding teachers accountable, there was little evidence of curriculum innovation in our data. There was substantial evidence of ICT being embedded across the curriculum ([Examples 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 13](#)) and some evidence of moves towards a greater emphasis on students carrying out 'research' on topics, using content from the learning platform and/or the internet ([Examples 3, 6, 11](#)).

## 17 Curriculum subjects

The data on curriculum subject priorities seemed to reveal that the post-16 group was responding differently from the other groups. In order to be able to find out whether these differences were statistically significant, it was necessary to merge the RBC, commercial and other respondents into one group (the 'combined others').

A simple ranking of subjects showed that there was no correlation in the order of importance placed on subjects between pre- and post-16 ( $r=0.48$ ;  $N=16$ ; ns). This means that the two groups do not attach the same level of importance to subjects overall. Performing an analysis of variance (ANOVA) for the groups and subjects showed that the differences lay with:

- Business studies ( $F=7.02$ ;  $df=2,122$ ;  $p<0.001$ ): this was statistically significant; however, as one would expect, the post-16 respondents (mean = 4.05) viewed business studies as very much more important than either the pre-16 (mean = 3.23) or combined others (mean = 3.09).
- Creative media ( $F=2.58$ ;  $df=2,122$ ;  $p=0.08$ ): this was not statistically significant, but indicates an unsurprising trend that the post-16 respondents (mean = 4.03) viewed creative media as more important than either the pre-16 (mean = 3.73) or combined others (mean = 3.43).
- Critical thinking ( $F=3.26$ ;  $df=2,122$ ;  $p<0.05$ ): this statistically significant difference shows that post-16 respondents (mean = 3.58) rated critical thinking as being less important than pre-16 (mean = 4.15) or combined others (mean = 4.06).
- Learning to learn ( $F=3.00$ ;  $df=2,122$ ;  $p<0.05$ ): this statistically significant difference shows that post-16 respondents (mean = 3.87) rated learning to learn as less important than pre-16 (mean = 4.29) or combined others (mean = 4.40).
- Problem solving ( $F=4.76$ ;  $df=2,122$ ;  $p<0.01$ ): this statistically significant finding shows that post-16 respondents (mean = 3.62) rated problem solving as being of much less importance than either pre-16 respondents (mean = 4.15) or combined others (mean = 4.29). Problem solving is one of the wider key skills in the post-16 phase.
- Vocational ( $F=3.00$ ;  $df=2,122$ ;  $p<0.05$ ): this statistically significant difference shows that pre-16 respondents (mean = 3.44) rated vocational subjects as being of less importance than post-16 respondents (mean = 3.63), who in turn rated it as less important than the combined others (mean = 4.29).

Referred to in *Extending the curriculum: Implementation and uptake* (p48)

## Gaps and other problems

There was widespread support from the interviews for embedding ICT across the curriculum, and recognition that doing this effectively would entail significant change in practice. However, it was clear that there was a mismatch between the aspirations being expressed and what was being achieved, which reflects the findings in the literature<sup>76</sup>. Indeed, a substantial subgroup of the interviewees specifically mentioned a lack of shared vision, which was often identified in terms of schools not understanding what potential a particular technology offered, or not knowing what the school intended to achieve through the use of ICT in their context (see p82 **Key implementation issues: Shared understandings**). These tensions were evident in the respondents' differing curriculum priorities and also the ways in which their organisations were implementing learning platforms.

Learning platforms clearly have potential as a vehicle to support skills development by providing learners and educators with sophisticated tools for communicating and collaborating. However, the data suggested that in practice such sophisticated uses were not the norm and that the platforms were largely viewed as repositories of digital content. This emphasis on the delivery of content to teachers and learners is also reflected in the e-strategy (see p58 **Digital resources**).

## Areas for further research/development

While there is widespread support for the need to refocus the curriculum on 'information age' skills, further work is needed to understand the most effective ways to integrate ICT into the curriculum in order to support their development. This work needs to be integrated with that in the areas of **new pedagogy** (p51) and **new assessment** (p54), as these three aspects of teaching and learning are intimately linked.

## Overview

Priority 2 asserts that traditional educational approaches have not achieved enough, and that we need to develop an understanding of how ICT can support the transformation of education so that it makes use of pedagogies appropriate to the 21st century. Central to the e-strategy is the drive for personalisation of education, so that learners are supported at times and places that are appropriate to their needs and in ways that suit their personal dispositions, in order to maximise learning outcomes (see Appendix 1 in the [eSIR reference statement](#)). Priority 2 specifically identifies the need to consider new combinations of modes of interaction, which maximise the possibilities that ICT opens up, including blends of face-to-face and online learning. These need to be matched by the development of new forms of assessment and curricula (see p54 [New assessment \(including e-portfolios\)](#) and p48 [Extending the curriculum](#)).

## Implementation and uptake

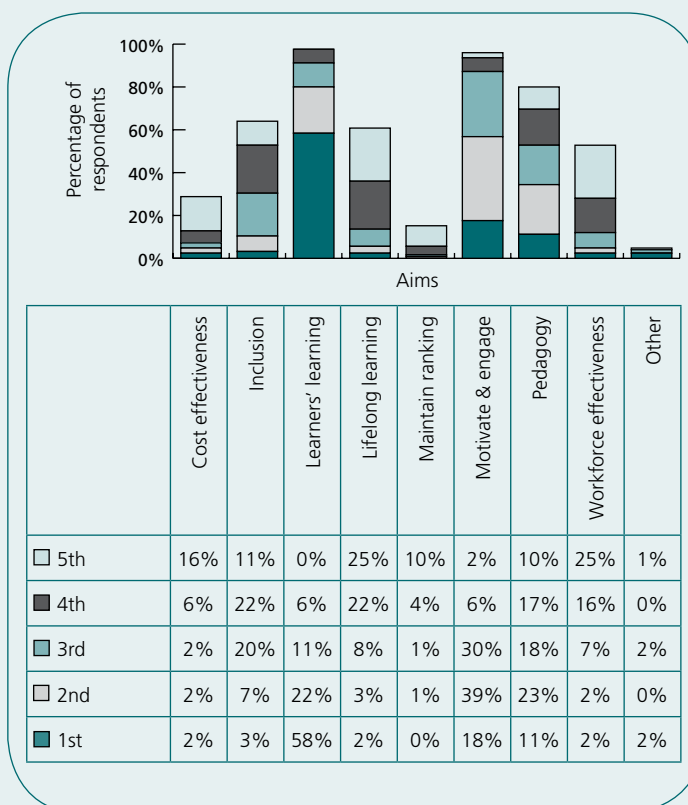
Improving pedagogy was seen as one of the five most important aims underpinning their organisation's vision for 80% of the respondents to the web questionnaire. Only improving learners' learning and motivating and engaging learners were more frequently included in respondents' top five aims (for more details see [panel 18](#)).

The importance of pedagogy was also evident in the interviews and there was widespread recognition that in order for ICT to be used effectively to enhance learning across the curriculum, changes in pedagogy were essential. Many of the interviewees highlighted the difficulty of transforming practice, an issue which is explored in more depth in [Key implementation issues: Complexity, change and the e-strategy](#) (p66). In the vast majority of cases there was little evidence of changes in pedagogy having taken place. The small number of exceptions to this tended to relate to increased learner activity and responsibility, usually involving the use of a combination of systems (learning platform plus mobile device, for instance, or IWB plus internet connection/learning platform).

## 18 Aims

Respondents were asked to rate the five most important aims relative to their organisation's vision. Figure 18.1 shows the percentage of respondents who included particular aims among their five most important. It indicates that 'to improve learners' learning' was the most commonly cited aim overall (98% of respondents included it in their five most important aims), and was the one that was most frequently listed as the primary aim (58% of respondents). 'To motivate and engage learners' was the second most frequently cited aim overall (96% of respondents included it in their five most important aims), and was the most commonly cited second aim (39% of respondents).

**Figure 18.1** The five most important aims across all web-questionnaire responses (n=125)



Of the options provided, 'to maintain ranking relative to other similar providers' (15%) and 'to increase cost effectiveness of provision' (29%) were the least likely to be included in the top five aims.

Referred to in [New pedagogy: Implementation and uptake](#) and [Key implementation issues: Shared understandings](#) (p82)

It is a long process, particularly in terms of changing practice: how teachers teach and how they engineer and guide learners' learning. Building a pan-regional fibre-optic infrastructure is nothing compared to changing teachers' pedagogy! We are, however, gradually increasing the number of teachers using the platform themselves or encouraging pupils to use it. Interview 11 – RBC



## 19 The Computer Practice Framework

New technologies potentially provide a means of transforming education, but their use by no means guarantees it (Resnick 2002). The key is how they are used. The Computer Practice Framework (Twining 2002a) provides a way of conceptualising ICT use in order to facilitate thinking about its implementation. In particular, it highlights that where ICT is being used as a 'learning tool' across the curriculum there are three different forms of impact it can have, each of which has different implications. Table 19.1 summarises these.

**Table 19.1** The three modes of impact in the Computer Practice Framework

Mode	Characteristics	Example
Support	Enhances the efficiency and effectiveness of the teaching, but without fundamentally changing what is learnt	Using software to develop/reinforce or automate the testing of knowledge or understanding of number bonds, fractions or any other similar knowledge
Extend	What is learnt and/or how it is learnt are different – but this change could have been achieved without the technology	Using a computer to facilitate collaborative working between learners in a classroom
Transform	What is learnt and/or how it is learnt are different – but this change was only possible with the use of the technology	Creating multimodal, hypermedia representations of information

While all three modes of impact can be beneficial, it is worth asking the following questions.

- Does using ICT in the 'support' mode make full use of the potential offered by the technology?
- Is using ICT in the 'extend' mode cost effective? Could the same learning outcomes be achieved more easily, cheaply or better without the technology?
- How important is it that learners engage with the new forms of representation and ways of engaging with the world that new technologies make possible?
- Given limited resources, which means that we cannot afford to use ICT in all three modes, which one(s) do you consider to be the most important?

For further details of the Computer Practice Framework and a range of other frameworks for thinking about educational ICT see the CPF website [<http://www.meD8.info/cpf>] and/or Twining (2002a).

Referred to in *New pedagogy: Areas for further research/development* (p53)

## Examples

Evidence of pedagogic shifts was rare. One respondent (working outside the UK) described 'breaking down the walls, burning the blackboards and offering learning gardens for groups of 60 students with three coaches on the floor' with the aid of a learning platform. This not only supported learners in choosing, planning, organising, finishing and reflecting on their own learning, but also teachers in maintaining an overview and giving just-in-time coaching. Three respondents talked about the impact of interactive whiteboards connected to the internet, which – while often increasing the amount of whole-class teaching – could also (with appropriate support) change the nature of the teaching/learning interaction (see p79 **Key implementation issues: Support**).

## Gaps and other problems

The e-strategy, as illustrated in the **eSIR reference statement** (Appendix 1 pi), clearly envisages that traditional pedagogy will be extended with the aid of ICT, and that learners will be given progressively greater responsibility and choice. However, the existing infrastructure – including the basic organisational features of schools and colleges such as 50-minute lessons, grouping learners by age, and classes of 20–30 learners with one teacher – are the very factors that inhibit the developments needed<sup>77</sup> and that ICT makes possible. Furthermore, pedagogy, curriculum and assessment are intimately linked<sup>78</sup>: the sorts of changes in pedagogy identified here will not happen without corresponding changes in curriculum and assessment<sup>79</sup>.

There appeared to be a reality-rhetoric gap<sup>80</sup> in this study's data: what people say needs to change is not reflected in the ways in which they advocate or are implementing technologies. While the rhetoric is about transformation, the ways in which use of ICT is envisaged is more likely to reinforce traditional pedagogical models – albeit with greater differentiation for learners through the use of ICT to automate teaching and assessment. There is a danger that ICT is being used to reinforce '19th-century models of learning' (including the curriculum) rather than enabling 21st-century models to be established.

### Areas for further research/development

Further research, such as that undertaken by the dICTatEd project (see p42 [panel 15](#)), is needed in order to develop shared understandings of how ICT should be being used in order to transform pedagogy, curriculum and assessment. Such work could take the [eSIR reference statement](#) (pi) as a starting point, particularly if informed by an understanding of different modes of ICT use such as those offered by the Computer Practice Framework (see p52 [panel 19](#)).

Longitudinal case studies that examine the impact of using ICT to support a range of different pedagogical models on learners and learning outcomes should be conducted, with a view to exploring effective ways of using ICT to enhance education. These should inform our shared visions for education in the 21st century as well as how to manage the change from our current ways of working to more effective ICT-enabled pedagogical models.

It's no good taking 21st-century technology and replicating 19th-century learning.

Interview 25 – LA

In the classroom we're seeing increased use of IWBs in lessons and a slight increase in whole-class teaching (5%). Where there is whole-class teaching, the use of IWBs is common practice. There is increased and improved use of questions and pace of questioning – IWBs are being used less exclusively as large screens – the quality of interactions is improving (based on our observations and reports back from teachers). Teachers are asking more questions, involving more pupils, waiting longer for answers, using more open questions because of the more visual nature of questions. (How many people think the answer will be x?) Even closed questions can be talked through – everyone can see how they got the answer. The use of closed questions is still paramount – as it lets you get through more questions.

Preliminary interview 12 – LA

They aim to move teachers from replacement to transformational use of ICT, and so will be hitting pedagogy in the next two or three years.

Interview 44 – LA

...89% of classrooms have IWBs. Anecdotally we're being told that, once you've given a teacher an IWB, when it breaks down they say they can't teach any more ... We are keen on wireless technology and tablets. Used well, they fundamentally change the quality of learning (it couldn't be done in any other way). We see lots of interactivity, with groups working around the IWB or tablet.

Preliminary interview 13 – LA

It [using learning platforms] isn't about content: it's about the pedagogy; but until the infrastructure is there you can't talk about the subtler things. Initially you have to go through the boxes and wires discussion, and that is where we are at with VLEs. People are not ready to engage with the raft of different things that VLEs can do in relation to pedagogy. Interview 40 – Other

### Overview

Priority 3 highlights the potential for ICT to enable us to modernise both the curriculum and its assessment. The e-strategy highlights three specific facets of this. Firstly, Priority 3 calls for streamlining the assessment process by using ICT to automate some aspects. For example, the use of online tests and personalised diagnostics could potentially enable on-demand and just-in-time assessments that provide immediate learner feedback, some of which might be formative in nature. Secondly, Priority 3 emphasises the need to include the assessment and accreditation of e-skills in the assessment of all curriculum topics. Thirdly, Priority 2 identifies e-portfolios as a mechanism to record learners' achievements and to facilitate transitions between different learning contexts throughout life (see p32 [Collaboration](#)). An e-portfolio would usually be seen as providing three types of functionality:

- a repository for the student's own work (a private space)
- mechanisms for a selection of work to be assessed
- mechanisms for presenting selections of work as evidence of achievement.

### Implementation and uptake

**Figure 3** (p23) showed that 64% of respondents had implemented assessment recording and analysis (which could include e-portfolio systems) as part of their learning platform functionality. Around 64% of respondents also said that they were providing tools (such as Hot Potato) for creating online assessments. However, there was little evidence in the eSIR data as a whole of any use of forms of e-assessment other than e-portfolios. One interviewee talked about how his company's online revision system provided immediate feedback to users as well as recording data which could be analysed and fed back to the users' schools. One FE college reported using its own in-house assessment-builder tool to develop online tests, which recorded data in the college MIS. Another FE college mentioned using online quizzes.

This reflects the findings in the literature. For example, Becta<sup>81</sup> found that in 2005 fewer than 5% of primary schools used online computer tests, except in maths, English and science at Key Stage 2 – where the figure was fewer than 10% of schools. In secondary schools,

online tests were used in fewer than 10% of schools except in science (Key Stage 3 <15%), maths (Key Stage 3 <20%, Key Stage 4 <15%), and ICT (Key Stage 3 <40%, Key Stage 4 <20%). In relation to the FE and sixth-form colleges, Becta<sup>82</sup> found that online assessment was widespread in only 6% of colleges, and was considered insignificant or limited to individual enthusiasts in 35% of colleges. However, e-assessment looks set to be a growth area, with online testing of Key Stage 3 ICT becoming compulsory from 2008 in England<sup>83</sup>; a push on online testing in Scotland<sup>84</sup>; and similar developments in Northern Ireland, where online assessment has been being explored for at least five years and where a number of qualifications available through the CCEA are taught and assessed online<sup>85</sup>.

E-portfolios were mentioned in 20 of the 64 phone interviews: half of those interviewees were already implementing e-portfolio systems, while the remainder were either already implementing them, were experimenting with them or hoped to start implementing them soon. However, the lack of shared vocabulary was again an issue (see p56 [Gaps and other problems](#)) and the number of organisations that were implementing systems providing the functionality one would expect of an e-portfolio system was clearly lower than the preceding data suggest. This compares with data from Becta<sup>86</sup> that shows 18% of primary and 25% of secondary schools as providing a 'formal electronic portfolio' in 2005.

Four interviewees described e-portfolios as one way of extending the focus of assessment on skills development and in supporting students moving between schools, usually in the context of ICT as a subject. One organisation was working with an exam board in order to extend DiDA so that students could use ICT in other subject domains and their e-portfolio could be assessed both in terms of that subject domain and ICT.

Most of the respondents who discussed e-portfolios viewed them as providing a solution to the problem of traditional assessment, as the latter was overly focused on 'the product' rather than 'the process'. This reflects the QCA's view that by 2009 'all awarding bodies should be set up to accept and assess e-portfolios'<sup>87</sup>. However, one respondent

was concerned that e-portfolios were a solution looking for a problem and compared them with previously unsuccessful initiatives involving records of achievement (Interview 38 – CLC). This fits with concerns expressed in the grey literature about the extent to which e-portfolios meet the core requisites for assessment systems, particularly relating to scalability, owing to the costs of marking them<sup>88</sup>.

### **Example 9 – Using an e-portfolio system to enhance assessment of ICT across Key Stages 2 and 3**

One LA reported using a proprietary e-portfolio system initially developed to support the assessment of Key Stage 3 ICT. The system, which is not SCORM compliant (see [panel 20](#)), is used by approximately half the schools in the LA with Key Stage 2 and Key Stage 3 pupils, to support continuity and progression in ICT for students moving from Year 6 in their primary school to Year 7 in their secondary school.

The system, which is available over the internet, gives teachers a bank of ready-made tasks and resourced units to which they can teach in order to cover ICT capability. It also offers a structure to students to enable them to create their own e-portfolios. The units have been developed to ensure that students upload work that shows significant aspects of the process they have gone through; for example, if they were incorporating an image into a PowerPoint presentation, they might include their original photo and the stages they followed in editing it. This enables teachers to track the whole process that students have gone through. In addition, teachers and students can add and edit messages for each piece of work in the e-portfolio. These facilities make it possible for teachers to assess the process as well as the final product, all of which can be done online. The teacher can then transfer the child's work, their notes and assessment to the school and/or LA e-portfolio for colleagues to see, which facilitates moderation both within and across schools.

In this instance teachers have reported high levels of pupil engagement, and parents have shown 'terrific interest' in their children's e-portfolios. The resources in the system support teachers, not only by providing materials that take them beyond the QCA schemes of work, but also by helping them to

make valid assessment judgements about their pupils' ICT competence. It helps school ICT co-ordinators to obtain an overview of work across the school too, and the LA to make cross-cohort comparisons. However, using the system can create a workload issue, especially during the initial stages of use. Some schools have progressed beyond this stage, and now use the e-portfolio system instead of other forms of assessment for ICT.

The LA is looking to use the system in other subject areas in the future; the system already provides the necessary structures to enable this, but lacks appropriate content.

### **Example 10 – Using e-portfolios to enhance assessment in FE**

One FE college uses an e-portfolio system, as part of its VLE, to support students in documenting their achievements in subject domains such as construction. The key is that the system allows students to upload digital photographs as an easy, practical and more fun way of recording progress.

However, the system has had drawbacks, including problems with the file size of digital images. A particular limitation with their e-portfolio system is that the students' work has to be printed out and sent away for marking rather than being marked online. This is an aspect of the system that the college is keen to improve.

## **20 SCORM**

There is a wide range of standards for interoperability of ICT systems and SCORM is just one of them. SCORM, which stands for 'sharable content object reference model', is a collection of standards/specifications for web-based learning systems. In effect it allows the sharing of digital resources that may be grouped to form sequences of learning objects.

For more details see Wikipedia [<http://en.wikipedia.org/wiki/SCORM>] (viewed 15 May 2006).

Referred to in New assessment (including e-portfolios): Example 9 and Digital resources: Gaps and other problems (p60)

### Gaps and other problems

While the curriculum can act as a barrier to the use of new technologies in transforming learning, it seems clear that assessment is the key driver (or limiter) of education<sup>89</sup>. The predominant current forms of assessment are limiting the effective use of ICT across the curriculum (see [panel 21](#)). One of the key problems is the mismatch between the things that are being assessed and the things that ICT can most effectively support (see p20 [panel 4](#)), and this is limiting the scope for change in curricula and pedagogy (see p48 [Extending the curriculum](#) and p51 [New pedagogy](#)). Modes of assessment need to match educational goals and aspirations<sup>90</sup>, rather

than controlling what is to be learned. This requires a shift in emphasis away from traditional forms of assessment such as essays and paper-based exams towards methods which are better suited to assessing processes and skills<sup>91</sup>.

Shared vocabulary was again an issue, with respondents, for example, using e-portfolio to mean anything from a shared disk area to a system that enabled the process of developing a digital product (which might take a wide range of forms) to be recorded, shared, annotated, discussed and marked online, with 'assessments' being automatically recorded (see p82 [Key implementation issues: Shared understandings](#)).

## 21 Constraints on innovation

High-stakes testing has been shown to have negative effects on learners, teachers and the curriculum (Harlen 2005; Harlen and Crick 2002; Black and Wiliam 1998). One of the effects noted is that 'although what is summatively assessed is valued in the curriculum, it is formative assessment that leads to learning' (Harlen and Crick 2003 p1). This focus on summative assessment is largely due to its use for monitoring pupil, teacher and school performance. The reliance (in England) on narrow accountability measures based on exam success has limited both the opportunities for learners to use computers for learning (Somekh *et al* 2001) and the scope for experimentation with ICT in education (Davies, Hayward and Lukman 2005). This is less of a problem in the creative subjects, where performance and standards are not as yet so strictly monitored (Loveless 2003).

The nature of summative assessments is also an issue, because these 'rely heavily on testing the memory of pupils and their ability to produce certain facts on demand' (McFarlane 1997 p3). Lewin *et al* (2003 p48) argue that this approach to education, which is based on 'the transmission of large quantities of pre-specified knowledge followed by high-profile national tests to ensure that students meet attainment targets ... can never maximise the benefits of this medium [ICT]'. Many claim that there is a mismatch between the nature of the learning that ICT can best support and what is assessed (Osborne 2003; Loveless 2002) and that this has limited the use of ICT in schools (Cuban 1993; Hennessey *et al* 2003). This view is echoed by Heppell (2000), who highlights the need to focus on process ahead of product, and argues that 'Criterion referencing forces us to "do that which we did before", resulting in the most innovative of children's work being pushed into marginal areas of children's learning or often outside of school altogether.' The EUN (2003) similarly suggests that present assessment

methodologies tend to reinforce old-style pedagogies and cultures and, in so doing, limit the scope for the kind of social collaborative learning that a VLE can promote. Conversely it has been argued that if assessment (and the curriculum) were revised to reflect the new learning goals, teachers would make greater and more appropriate use of ICT (Barton 2001).

Assessment and curriculum are closely connected, and while there is little in the way of empirical research that indicates a clear link between the introduction of the National Curriculum and National Strategies and a reduction in risk taking in schools, there is substantial support for this view within the education community (Hacker and Rowe 1997; Harlen 2005; Harlen and Crick 2002; Black and Wiliam 1998). This is accompanied by advocacy of the need to adjust the curriculum and assessment to place greater emphasis on creativity and higher-level skills. The 'thinning down' of the National Curriculum in 2000 (DfEE 2000) and the introduction of the new Primary Strategy (DfES 2003), which place emphasis on creativity, suggest that a shift is occurring at least at the 'lower' end of the education system.

*It is hard to build ICT into conventional assessment, and there is still a distrust of distance education.*

*(Interview 48 – Other)*

*But it is interesting that the schools in difficult circumstances are particularly keen – rather than shutting the door on us and saying they need to 'stick to the textbook'. This is driving exciting and stimulating work with students, which has a positive spin-off on learning as they feel their work is being recognised.*

*(Interview 17 – LEA)*

Referred to in [New assessment \(including e-portfolios\): Gaps and other problems](#) and  
Key implementation issues: [Support \(p79\)](#)



A number of different e-portfolio systems were in use, some of which (in the schools sector) had been developed specifically to support the assessment of ICT competence. The degree of interoperability of these systems with learning platforms, MISs or indeed other e-portfolio systems – while not always clear – appeared to be limited. Interoperability of such systems is essential in order to meet the expectation of the e-strategy<sup>92</sup> that learners can carry on using their e-portfolio throughout life. This is an area that is already being explored by Becta, the DfES and the QCA<sup>93</sup> (see also p31 [Learning platform/MIS interoperability](#)).

### Areas for further research/development

Further development and research are needed in order to devise new forms of assessment that better match educational goals, and which could become vital drivers for change in curriculum and pedagogy.

E-portfolios may offer one potential solution to the assessment problem, but their development and uptake is still at an early stage. Further work is needed to investigate:

- the ways in which lessons learnt from the use of portfolios (in domains such as art and design) might inform and enhance the development of e-portfolio systems
- the role that e-portfolios might realistically play in enhancing formal assessment/ accreditation of learners' achievements, including consideration of the costs of implementation and marking
- how they might be used most effectively as tools to support lifelong learning (including facilitating transitions between educational institutions).

Current assessment doesn't target the skills that ICT facilitates – for example parents in Denmark have asked already that their children be allowed to complete their exams using computers: they argue that asking them to handwrite their exams is going against the way they work in their learning in schools and this is in fact to penalise the children. The Ministry is taking this on board and is looking at all the issues in order to try to replicate the conditions of learning.

Interview 48 – Other

...not just the time, but the kind of qualifications teachers are being asked to do – academic qualifications. We need to reward teachers at the right level for what teachers are doing in school. We need to move away from the 4,000-word essay, which undermines them – we need to move to practitioner research. The iron grip of conventional qualifications is the key problem – there's a mismatch with aims. Value still goes to writing a conventional 4,000-word essay.

Interview 33 – Other

Assessment is a big inhibitor; it tends in all countries to be more traditional than even the teaching in classrooms.

Interview 47 – Other



Overview

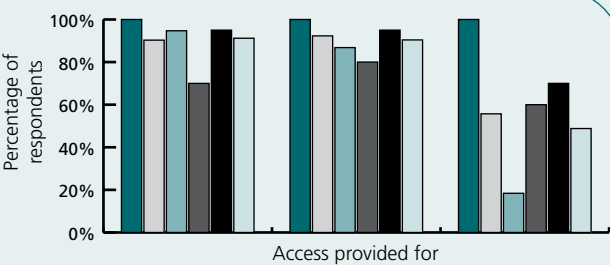
Priority 3 places a substantial emphasis on digital resources as a key vehicle for transforming education and addressing the personalisation agenda. While it identifies that much progress has been made in this area, it recognises the need to:

- increase the quantity and range of resources that are available to teachers
- increase the quality of those resources, which includes increasing the innovation of their design so that it takes full advantage of the interactive nature of ICT and moves away from content delivery

22 Access to digital learning resources

When we asked respondents to identify which groups of users their organisations provided with access to digital resources, we found some variations across the respondent groups, which are shown in Figure 22.1. Most noticeably, all respondents from the RBCs provided access for all three groups of people (staff, students and parents/other members of the community). Commercial respondents were the least likely to provide access to digital resources for staff and students, and more likely to provide access for parents or the community than the post-16 or pre-16 sectors. Not surprisingly, the post-16 sector is the least likely to provide access to parents or the community.

Figure 22.1 Who is given access to digital resources?



	Staff	Students	Parents/ community
RBC (n=5)	100%	100%	100%
Pre-16 (n=52)	90%	92%	56%
Post-16 (n=38)	95%	87%	18%
Commercial (n=10)	70%	80%	60%
Other (n=20)	95%	95%	70%
All (n=125)	91%	90%	49%

Referred to in Digital resources: Implementation and uptake

- provide the technical and cultural infrastructure to support digital resource creation, sharing, adaptation and re-use.

Implementation and uptake

Of the 125 respondents, 94% said their organisation provided access to digital resources. The vast majority provided access to digital resources for staff (91%) and students (90%). Far fewer supported access for parents or other members of the community (49%). For more details see [panel 22](#).

The 117 respondents who indicated that their organisation offered access to digital resources were asked to specify the nature of those resources. The most commonly provided resources were locally developed or procured: ‘Access to institution/ department-level collections of digital resources’ (85%), followed by ‘LA/regional collections of digital resources’ (62%). A relatively small proportion of organisations were planning to provide access to additional sets of resources; the maximum being 16% of respondents, who said they were planning to provide access to the NEN resources. [Panel 23](#) (p59) shows a breakdown of the resources provided.

Additional questions explored the extent to which organisations had implemented copyright management and/or resource standards management (for instance SCORM compliance enabling transfer of resources to other systems). Some 37% (of the 117) reported that their organisation had implemented copyright management, with a further 25% planning to do so. And 46% of organisations had implemented resource standards management, with a further 25% planning to do so. In the post-16 group these figures seem to reflect the lack of college policies on the re-use of e-learning materials that is reported in the literature<sup>94</sup>.

As already noted (p20 [Learning platforms: Implementation and uptake](#)), a major focus of the use of learning platforms was on accessing content. Given the patchy uptake of learning platforms, it seems reasonable to conclude that use of digital resources in learning platforms is also uneven and generally low. This reflects the reported position in FE and sixth-form colleges, where for example only 13% of colleges using NLN materials reported that in 2005 their use was common practice<sup>95</sup>.

### Example 11 – Access to diverse commercial resources via a single sign-on

In one LA the use of a sophisticated portal enables widespread use of digital resources from diverse commercial sources. This complements an e-portfolio system which is used for hosting home-produced content.

When Curriculum Online initially emerged, there was anxiety about the proliferation of URLs and usernames/passwords, which the LA thought might inhibit digital resource use. Primary schools in particular felt overwhelmed, so the LA developed the portal as an easier starting point for schools. The portal provides users with one central log-in to around 40 suppliers' systems. The user can log in with the username and password that they have been given for the portal and can then access and cross-search all the resources from any supplier that their school has paid for.

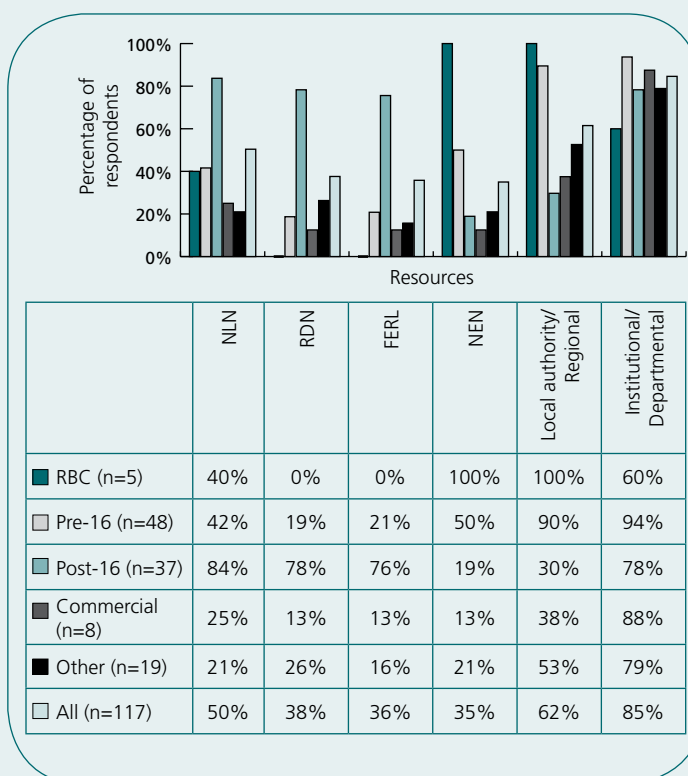
For the portal to work, the LA negotiated with suppliers to gain access to the metadata for their digital resources. Merging all of this metadata with school purchasing information resulted in the ability to cross-search material from different suppliers (so long as a school had paid for access to that supplier's data). This worked well but was dependent on the quality of suppliers' metadata. Initially this was a problem, which meant that search results were dominated by those suppliers' resources which had been tagged properly. Feedback to other suppliers that their resources were not coming up in searches encouraged them to improve their tagging.

The system has been very successful both in saving schools money through aggregated procurement arrangements and also in usage levels. Around half the schools in the LA are regular users of the system. The main technical problem they have had relates to systems from suppliers which track students' activity in order to give them feedback on their progress. However, the LA has found ways to overcome this from their perspective, though at least one supplier feels that the quality of the service they can provide to schools has been reduced. The LA has also had problems because some teachers are reluctant to tell students their usernames and passwords as the teachers want to keep the portal for their own use.

## 23 Digital learning resources provided

Figure 23.1 gives a breakdown by sector of the resources that are already being provided.

Figure 23.1 Digital resources provided, by sector



This shows the following.

- Commercial respondents were less likely than other sectors to provide access to collections of digital resources and, not surprisingly, where they were providing access to digital resources these would be ones that they had developed themselves.
- NLN, RDN and FERL resources were most often used by post-16 organisations.
- NEN resources were most often used by RBCs, and least often by commercial and post-16 respondents.
- Regional collections were least often used by post-16 respondents' organisations.
- Pre-16 organisations were most likely to use internally developed digital resources.

Referred to in Digital resources: Implementation and uptake (p58)

A negative aspect of feedback when something has changed has been that users can't find things. This can be due to information skills of users in tagging the resources they place on the portal. But also, when you make it easier for users to publish resources, you don't have information experts with them to tag resources, so this isn't always done very well. Interview 24 – LA

### Example 12 – Collaborative teams developing digital resources at a regional level

One RBC described how it was focusing on working with teams of teachers and developers to produce high-quality digital resources that could then be rolled out to all the schools in their area.

Their approach is to bring together a team of teachers for several days to plan and storyboard ideas for resources. The teachers come from a variety of schools across the region, and have different interests and perspectives. The teachers work in groups, initially to identify what is needed and how it relates to the curriculum. This process usually results in ideas that suit most practitioners' needs within the region. The teachers' ideas are then turned into digital resources by developers based in the CLCs.

The role of the RBC is to co-ordinate the work and help to ensure its quality. It has funding which it gives to the CLCs, LAs and schools to pay for teachers' and developers' time. The RBC takes the copyright but releases the material to schools in their area free of charge.

This approach helps to overcome the 'not invented here' syndrome, in that the resources have been developed by teachers in the LAs where the resources are going to be used. Given the scale of distribution of the resources, the relative cost of their development per user is very low, provided that the resources appeal and are used widely. Since the resources are closely linked to the expressed needs of the teachers in the region, this is likely to be the case. The RBC can thus focus on resources that would be a much higher risk for commercial suppliers to develop. The RBC aims to complement and supplement the commercial products already available.

### Gaps and other problems

Issues surrounding digital resources, which were generally referred to as 'content', were a key theme of the interviews (see p61 [panel 24](#)). However, content appears to be a 'second-stage' issue, while infrastructure is a primary problem.

'Content' covers everything from a digitised document or a single image through to complex SCORM-compliant e-learning objects (see p55 [panel 20](#)) and major sets of content such as the NLN materials. People at different levels tended to focus on different parts of the spectrum of content; people

at RBC and LA level are thinking about aggregated supply, whereas people focused on school/college level are more concerned with the content teachers and lecturers create that is closely linked to their teaching approach.

Some respondents felt that there was certainly scope for aggregated sets of content, but that these need to be fit for purpose and also that teachers need to be persuaded of this (Interview 14 – RBC). However, when teachers or schools/colleges attempt to create their own content tightly linked to teaching and therefore potentially highly acceptable to teachers, the scale of the task often defeats them (Interview 26 – LA). The response to this was to look at collaboration and sharing, but this was inhibited by competition between schools and lack of trust in other teachers, as teachers are not used to collaborating with others outside their own institution (Interview 5 – LA). In some areas teachers were working with more specialist staff such as web designers to share and develop expertise (see [Example 12](#)).

There was considerable difference between perceptions of the content needed at FE and school levels. FE is looking for specialist content tied to specific courses and suitable for presentation as SCORM-compliant learning objects that more mature learners can use. Schools, on the other hand, view content in a manner that is more closely linked to evolving classroom teaching (for example, Interview 20 – LA; Preliminary interview 5 – LA; Interview 4 – LA).

All of these problems are compounded by the difficulty of finding content which is already accessible through a learning platform. Teachers struggle to use metadata for searching and to apply metadata to content they have created (Interview 24 – LA; Interview 26 – LA). The tagging of data is not an entirely transparent process for those untrained in the procedures, and incorrect initial identification causes considerable later problems for users.

A very small number of respondents mentioned 'quality' in relation to content and, where they did so, they referred to the need to be working towards ensuring 'quality and availability' or 'quality and reliability of tagging'. This lack of overt concern with quality suggests that, as yet, the dimensions of quality are undefined in, for example, production and presentational standards, SCORM compliance or

Some schools, however, feel that they can't trust content created by others, but feel they haven't got time to create their own similar resources – we need to find a balance between these two positions. Interview 5 – LA

## 24 Additional quotes about content

*Inevitably resources and tasks that could be printed out tended to result in the students' final product being 'marked', although it was really the process we wanted assessing.*

*(Interview 21 – LA)*

*The ability to push content which is targeted to learners, rather than general, has helped.*

*(Interview 13 – FE)*

*Simple cost benefits – procurement. And cheap content development – through working with teachers and so on.*

*(Interview 14 – RBC)*

*Schools are reducing the use of Curriculum Online materials in favour of free materials that are managed through [name of system]. Of 200 schools, about 100 are regular users.*

*(Preliminary interview 5 – LA)*

*More training on accessibility, copyright issues and the type of content – many tutors have put Word documents on as it's easy and quick to do, and can be downloaded by students. Online documents would be better for future tracking and storage, and can include links – practically there hasn't been time for learning how to do this and then for actually doing it, so it will probably mean in the future going back and re-doing it in this way. This would be better, such as in allowing pupils to access the work after the lesson if they are absent or if they want to recap on anything (particularly useful for revision).*

*(Interview 12 – FE)*

*Some primaries don't run an in-house server, just save work and resources in the portal – this allows them to do some authoring (individually or collaboratively), create and link pages, and gives them email.*

*(Interview 11 – RBC)*

*Content creation has mostly been done by teachers working collaboratively. There have been some projects to fund teachers to work collaboratively to develop resources, and to build on, develop and implement resources.*

*(Interview 11 – RBC)*

*Reduce duplication of what each institution has created or borrowed, so if staff are willing to share it's much more effective.*

*(Interview, Ex12 – FE)*

*We find that schools don't tend to use online resources well. ... In some schools such as the one using it in their own digital arts qualification, they are teaching art but using digital technologies – this is a home-grown course and resources.*

*(Interview 5 – LA)*

*E-learning credits – need to ensure that people understand what they are doing with them.*

*(Interview 14 – RBC)*

*Teachers are encouraged to share resources – but folk are reluctant to put stuff up (open it up to criticism from whole of [name of LA]). Some is put up that ought not to be (quality is dubious): quality assurance is an issue. There's a dilemma between encouraging people to share without putting too many hoops and filling the repository with rubbish. There are problems of copyright because of teacher ignorance of the law.*

*(Preliminary interview 3 – LA)*

*While the gateway provides all with the same underlying infrastructure, they can customise the content themselves to allow local variability.*

*(Interview 7 – RBC)*

*We have a content manager who talks to schools and works out what they need. We spend about 50% of e-learning credits on generic stuff – schools are happy with that. With the other 50%, schools buy their own software. We can install this software for them so that only they can see it.*

*(Preliminary interview 13 – LA)*

*Sharing practice and resources doesn't easily happen if schools are in competition.*

*(Interview 5 – LA)*

*We would also like to work with open standards so that if and when teachers and students want to export what they have done or created, the systems would be able to support this – for showcasing or moving items to an individual portfolio. Open standards would support this.*

*(Interview 3 – Other)*

*With the current set-up, every school in [LA name], if they want to, can have access to a learning environment, which allows for home access to the resources, and so has the capacity to extend the school day.*

*(Interview 5 – LA)*

*We'd really like to develop new resources – we have the NLN ones and these are on the whole very good, but we would like to develop more particularly in specialist areas. It is very costly in time and money, so we are looking at this as a possible next development area.*

*(Interview 28 – Post-16)*

*... maybe giving staff remission to create resources. I'm currently trying to convince the finance director that this would be a good use of resource and viable.*

*(Interview 28 – Post-16)*

*Most VLEs need you to host materials in your own database. With [name of system] none of these materials are hosted: they're all online. So it means they're all maintained by the suppliers.*

*(Interview 20 – LEA)*

*Need to raise the bar about content to make it OK for students.*

*(Interview 14 – RBC)*

Development of content is the key: the VLE should not be perceived as empty. ... The major limit is teachers' time to develop new material and put material in a format that can easily be shared and re-used by others. ... Trials of tagging content for dissemination and use by other teachers are showing problems. This seems to be too time consuming an exercise to ask teachers to undertake. In the past, day-to-day contacts between teachers and the natural networks which grow in a smallish LA through time were sufficient to allow teachers to be able to locate content. Moving beyond this requires a formal tagging mechanism and the creation of metadata.

Interview 26 – LA

Schools often see the initiative as a 'techie' platform sort of thing, but the content is what schools are really interested in and it is how schools talk. The new team has been deluged by schools wanting help to get their content into the VLE and wanting training etc. This has had perhaps the biggest impact. ... The content people need to be in place very early or else you risk have a great big empty electronic cupboard.

Interview 37 – LA

IWBs have made a difference. Using an IWB requires you to rework your content – so ICT has forced people to review what they do.

Interview 29 – LA

We can develop – in ways that commercial providers can't – because we then get the material into many more schools.

Interview 14 – RBC

criteria for judging 'fitness for purpose' in any phase or subject domain. Becta has undertaken work in this area, resulting in the Content Quality Framework<sup>96</sup>.

Similarly, we found very little evidence of innovation in terms of digital resource design, except in the case of the CLCs and one RBC, which all mentioned game-playing technologies. Since an overarching goal of the e-strategy is to boost educational standards by developing online and flexible resources that are innovative and of a high quality, and which can be used to adapt the curriculum to the personalised needs of learners, these 'gaps' would seem to be worth exploring further.

The national emphasis to date has been on provision of content created by others, either by the commercial sector in schools (via eLCs) or by the NLN in FE. There has been little national leadership with regard to how to manage content creation at institution level and how to balance this with acquired content. Further systematic exploration, involving national and local collaboration, of the dimensions and criteria for 'quality' is needed. The role of LAs, RBCs and consortia of schools with regard to content is not clear. Leadership has been left to people locally who have the insight and the desire to resolve the issue.

### **Areas for further research/development**

Further research is needed in order to develop a vision of content provision which balances the use of effective home-produced content against SCORM-compliant e-learning objects and which provides models for organising and funding the effort of both teachers and expert resource producers. This research and development should include consideration of ways to enhance teachers' trust in resources produced commercially or through major projects and encourage more involvement in collaborative/sharing approaches. This would maximise the output from the small-scale efforts of many individual teachers.

It is necessary to look in detail at the interactions between approaches to content, infrastructure and professional development of education staff.



## Opening up access

### Overview

While Priority 2 highlights the importance of assistive technologies to enable learners who have disabilities to access education, Priority 3 identifies the potential role that ICT can play in:

- providing access to learning for those who cannot travel to a place of learning
- engaging learners who might otherwise be excluded or unwilling to access learning through traditional approaches, including those with specific cognitive difficulties, the disaffected and the disengaged.

### Implementation and uptake

As already noted in [Advice and support for learners: Implementation and uptake](#) (p38), over 40% of the 125 respondents to the web questionnaire thought that learning at a distance and '24/7/365' support were of primary importance. And over 80% thought that these were of primary and/or secondary importance (see p38 [panel 12](#)).

The analysis of [ICT functionalities](#) (p13) needed in order to meet the vision implicit in the e-strategy (and documented in the [eSIR reference statement](#)) identified that [learning platforms](#), [mobile devices](#) and [assistive technologies](#) were the key relevant technologies. See [Learning platforms](#) (p20), [Mobile devices](#) (p44) and [Support for Assistive technologies](#) (p41) for details of implementation and uptake of these technologies.

While 96% of the respondents identified motivating and engaging learners as one of the five most important aims that ICT could support within their organisation's vision, a substantially smaller proportion – only 64% – said that inclusion was one of their organisation's top five aims (see p51 [panel 18](#) for more details). This reflected the data from the interviews, in which motivation was frequently mentioned as an important element of ICT use, while only half a dozen interviewees (including two from FE colleges who were concerned about equity issues for part-time students) specifically discussed the use of ICT to extend access and engagement for hard-to-reach groups of learners. Several of these interviewees, while pointing out the steps they were trying to take, highlighted the difficulties of providing equality of access.

### Example 13 – Using PDAs to open up access to learning

One FE college described the use of PDAs as a means of access to its courses for Muslim women. This hard-to-reach group is traditionally educated in mosque schools or Islamic centres, which often do not provide internet access for students. The college therefore provided PDAs for students' personal use during their sessions in these outreach centres. The PDAs for the tutor and students were loaded with resources that as closely as possible resembled those on the college learning platform, the aim being to replicate the experience that on-campus students would have. The tutor was provided with a PDA linked to a data projector for whole-class inputs, thus allowing both class and individual study.

The biggest problem encountered, other than funding for the hardware, was the time needed to convert the existing web materials from the learning platform to the PDAs. This involved changing file formats, resizing images and reorganising material to fit on the small PDA screens. There was a tension between developing new materials specifically for the PDAs and converting existing web resources in order to maintain equivalence between the on-campus and outreach students.

The scheme has been very successful in helping to make access to education comparable to that of on-campus learners. The students were quick to work out how to use the PDAs, needing less formal support in this than had been anticipated. Both tutor and learner feedback has been very positive, with more peer-to-peer interaction during sessions, and students reporting that they feel they have more control of their learning and not wanting to return the PDAs.

### Gaps and other problems

It seems clear that ICT has the potential to enhance access to learning, and there is substantial evidence that it can have a positive impact on learners' motivation and engagement<sup>97</sup>. However, a number of issues need to be addressed, many of which have already been discussed in earlier sections of this report. For example:

- access to ICT facilities still remains an issue for many of those who are excluded from physically attending school/college (see p34 [Collaboration: Gaps and other problems](#))

The VLE is good for liaising with external students, differentiated curriculum, hospital, the excluded etc. Interview 9 – school



- there are limitations with current mobile devices (see p47 **Mobile devices: Gaps and other problems**)
- supporting learners at a distance, or providing greater personalisation of learning requires changes in traditional teacher roles (see p40 **Advice and support for learners: Gaps and other problems**).

#### **Areas for further research/development**

The government schemes for home access to ICT<sup>98</sup> highlight the importance that the Government places on overcoming the digital divide. However, further development and research is needed in this area, building on the national review of software licensing and document interoperability in relation to home and school computer use<sup>99</sup>.

The most effective models for providing online support, content and advice for learners need to be explored, taking into account the interrelationships between such provision and traditional school/college-based ways of working.

Further work is needed to define and develop the range of mobile devices to support learning. In addition, in-depth longitudinal studies would enhance our understanding of the most effective ways of embedding mobile devices in order to enhance learning.

I feel we have so far failed to nail down effectively an online learning mechanism for pedagogy and support: we need a framework and tools and we haven't yet found anything that gives the tools to support the rich ethnic and cultural mix in our city. We want to get to the 50% of students who are being 'failed' by the system, for we really need to support them.

Interview 17 – LA

One of the things we've noticed in our experience is how good these [mobile technologies] are at reaching 'dropout groups' and hard-to-reach sections of the community. They seem to respond to these technologies: it seems all teenagers understand the digital world and so education needs to address that digital world and how it works.

Interview 48 – Other

We've been piloting the use of learndirect materials with 14–16-year-olds who are excluded or in exclusion units. ... Equality of access is not one I would take on for the time being – it's too big.

Interview 29 – LA

The biggest issue – and it's a thorny one – is that, with every step forward we take, someone is getting left even further behind. People who are marginalised now (and we know that that is at least 10%) are likely to get even more disadvantaged. Inclusion is a hard one to crack. We are directing more resources at it rather than going for equity.

Interview 37 – LA

... generally people in hard-to-reach communities are often hard to reach in terms of having poor ICT access – no fixed technologies, no phone line – and so they tend to have to use mobile technologies such as the mobile phone, which has far higher access levels.

Interview 7 – RBC

# Key implementation issues

## Introduction

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The e-Strategy Implementation Review (eSIR) focused specifically on identifying the existing technologies and approaches being implemented in the school and college sectors that mapped onto Priorities 2 and 3 of the DfES e-strategy. However, it soon became clear that the major issues concerning the organisations in our sample related to management of change issues rather than to technological ones. This section of the report explores some of these issues.

The findings presented here reinforce the existing literature on the implementation of ICT in education. Their importance comes not from their originality but from the fact that, despite our having been aware of them for several decades, our interviewees still saw them as representing the most significant problems that we need to overcome in order to bring about the changes envisaged in the e-strategy.

## Introduction

Implementing the e-strategy requires significant change in many aspects of teaching and learning. Such change takes a considerable length of time, particularly in the context of a complex, dynamic and interrelated system such as education.

Related key implementation issues: Leadership (p77); Buy-in (p74); Focus on people (p70); Support (p79); Shared understandings (p82)

## The issue(s)

Transforming education through the use of ICT, as envisaged in the e-strategy, represents a second order change<sup>100</sup>. It requires rethinking familiar ways of doing things<sup>101</sup>. This is particularly difficult in the context of the education system, because of the dynamic and interrelated nature of its multiple components<sup>102</sup>. The education system is complex: changing one aspect of it will inevitably mean changing all the others<sup>103</sup>. This complexity was something that the interviewees were very conscious of; they recognised the need to address multiple aspects of implementing their ICT systems – spanning the technological, human, cultural and systemic. The key implementation issues which emerged from the data reflect the richness of their understanding of this complexity (see [the report's contents table](#) for an overview of the whole report, including the key implementation issues).

## 25 Long time scales needed

Scaife and Rogers (1996) offer a valid explanation of the failure of measurable benefits to accrue from the use of new technologies. In their research on graphical representations they have argued that the perceived benefits of such representations as static diagrams have been conferred on the learner through years of practice in the perceptual processing of visual stimuli and in the learning of graphical conventions. If this is the case, it is unsurprising that performance in using advanced graphical technologies such as animations and virtual reality, which are now so much a part of educational ICT usage, have not been able to demonstrate comparable performance or learning benefits as yet. Young learners and indeed teachers are still to develop the skills necessary to fully exploit such new learning experiences.

A similar argument might be put forward for information handling in the age of the internet, although skills learning in this area does have a somewhat longer history. The time frame within which benefits are currently being measured is too short to show the very real impacts of the technology.

Referred to in Key implementation issues: Complexity, change and the e-strategy

Embedding any change takes time: the more complex the change, the longer the time that will be needed. Second order change – which by definition is extremely complex because it involves new goals, structures and roles<sup>104</sup> – requires very long time scales<sup>105</sup>. In addition, even once the changes are embedded, it may take a considerable time for benefits to be visible (see [panel 25](#)). The interviewees were very conscious of the time required for their systems to become embedded, and often told us it is still too early to expect to see any impacts on learning. The data from the questionnaires and interviews indicated that our informants' organisations had been working on their current implementations of ICT, which predominantly meant the introduction of internet-based functionalities (including [p20 learning platforms](#)), for lengths of time that ranged from less than a year through to over ten years. Part of this variation related to whether or not they were viewing their current activities as radically different from previous work and thus in some sense discrete, or just as one element in a raft of related initiatives. However, it was clear that none of the interviewees felt they had yet achieved the kinds of transformations that the e-strategy envisages.

## Illustrating the issue

Some of our informants were using PDAs and other mobile devices to enhance access to learning or to otherwise enrich the learning experience (see [p45 Example 8](#) and [p63 Example 13](#)). The introduction of wireless PDAs inevitably raises a number of technical issues, for example related to providing an appropriate network infrastructure, the applications that PDAs will support and the design of content for their small screens, as well as systems for managing the rapid replacement and repair of faulty units. However, these technical issues are relatively minor compared to the pedagogical issues associated with such devices. Wireless-enabled PDAs can easily be carried around by students and teachers, which means that they can have ready access to ICT functionalities wherever they are. This has implications for the dynamics of the classroom<sup>106</sup>, which inevitably will involve changes in the nature of the roles, relationships and the sorts of interactions that take

place<sup>107</sup>. For example, if learners can communicate wirelessly, then they can access information via the internet and collaborate with their peers (even if they are not physically co-located), potentially without the teacher's knowledge. This opens up opportunities for learning in ways which fit better with current understandings of how people learn, which emphasise the importance of social context, collaboration and engagement within communities of practice<sup>108</sup>. However, using PDAs in this way would require not only changes in the organisation and management of learning spaces, but also changes to the role of the teacher, which has implications for teacher identity. As we have seen (Example 8), effective use of PDAs often means moves towards cross-subject working; and collaborative learning raises interesting issues for assessment (which currently focuses on individual performance).

### 'Solutions' being implemented

While there was some variation in specific details, there was general agreement that a number of core features of ICT implementation were essential and all had to be in place. These included:

- A robust technical infrastructure providing the necessary functionality (see p70 [Focus on people](#))
- Effective mechanisms for developing buy-in and shared understandings (see p74 [Buy-in](#) and p82 [Shared understandings](#))
- Support for the people who were expected to use the functionality provided (See p79 [Support](#) and p77 [Leadership](#)).

There was also agreement that taking a long-term, strategic view to the implementation and embedding of ICT was essential. Interviewees highlighted the problems associated with one-off initiatives, particularly where these provided capital funding to start the project but insufficient resource either for staff development or for replacement of kit over time. There was a strong view that there needed to be greater coherence and synchronicity between initiatives and policies at national as well as local levels in order to avoid fragmentation and duplication of systems. The e-strategy attempts to do this in relation to the 'Every child matters' agenda; however, the links between policies need to be bi-directional.

It is a long process, particularly in terms of changing practice – how teachers teach and how they engineer and guide learners' learning.

Interview 11 – RBC

Don't underestimate the time it will take to make the journey to transformative change: it won't happen quickly.

Interview 16 – Commercial

Such work [rolling out a learning platform] must be recognised as a multi-strand activity:

- development strand to make sure it works
- communication strand so that teachers know it's there and will benefit them
- content strand – needs to have something in it
- training strand to provide an opportunity for teachers to receive training (cascade to reach all teachers).

Interview 11 – RBC

... three corners of the pyramid. Has to be technically working and easy to use, provide the necessary functionality, and include support to support people. All of those!

Interview 15 – FE

The interviews clearly revealed a concern about whether the funding for implementation of the e-strategy would be sustained over the sort of time scale that was necessary to embed it. Respondents felt that a long-term commitment needed to be made to the implementation of the e-strategy. This needed to include guarantees about the long-term funding situation and thus the sustainability of programmes. Some felt that it was important that future funding was ring fenced and linked to sets of actions, including innovation and support for change, but that it should certainly not be tied to the purchase of hardware.

### Strength of the evidence

The literature highlights the complexity of classrooms and also that new technologies will alter the 'tools and routines' that make classrooms work<sup>109</sup>. There was strong evidence that interviewees' understood the complexity of implementing the kind of ICT initiatives that are envisaged in the e-strategy. All the respondents, irrespective of how long their organisation had already been involved in supporting the embedding of learning platforms or other relevant technologies, identified that these systems were not yet fully embedded. There was widespread agreement that the implementation of the e-strategy was at a

very early stage; this was expressed in terms of the work that was still needed to implement ICT systems within their organisation. This reflects the view in the literature that research into the implementation of 'powerful learning environments' is still in its infancy<sup>110</sup>.

Between the post- and pre-16 phases there was some variation in the extent to which implementing ICT appeared to be part of the organisation's strategic planning. It was clear that this was the case in the vast majority of the pre-16 institutions. However, the implementation of learning platforms and mobile devices in over half of the post-16 organisations appeared to lack the full and active support of senior management. This reflects data in the literature: 'Only 17% of colleges had college-wide plans [for the use of e-learning materials]'<sup>111</sup>, while '25% did not set targets for ICT and e-learning at all'.<sup>112</sup>

Funding differences were apparent between the pre- and post-16 interviewees – with lack of funds for equipment being a much greater barrier for post-16 than pre-16 organisations. Many post-16 institutions were struggling to put in place what they considered to be the basic IT infrastructure. There was certainly a perception among several of the post-16

It is unhelpful to isolate a particular project or initiative in this case. The strength and interest of the [LA name] case is the extent to which and way in which e-learning is integrated with the wider agenda of [LA's strategic plans]. A raft of initiatives is being undertaken – for example Laptops for All, ICT Test Bed, IWBs, Extended Schools and so on. However, given the way that [LA name] is approaching its agenda for change, there is little to be learned from unbundling them individually without further detail and the fit with the overall strategy.

Interview 36 – LA

The longevity and direction of funding brings many issues around sustainability.

Interview 14 – RBC

The contract finishes in December 2006 and there is no provision in the current contract for extension. Because it is EU funding it has to go out to full tender. If there is to be any continuation, we would be very keen to carry on and feel we have just created the critical mass required to really move forward.

Interview 16 – Commercial

interviewees that there was a disparity of funding between different phases of education. Uncertainty of long-term funding has been identified as inhibiting ICT uptake in schools<sup>113</sup>, and this appeared to be a block to implementation for several of the interviewees' organisations, and was a concern for many of them.

#### **Areas for further research/development**

There needs to be more work on developing mechanisms and a culture of sharing information about models and approaches that are proving to be successful. This might, for example, include exploring the use of process benchmarking.



## Introduction

Although a robust technological infrastructure is a key factor in the implementation of the e-strategy, what is abundantly clear is that our interviewees saw the 'people' dimension as of even greater importance.

Related key implementation issues: Leadership (p77); Buy-in (p74); Support (p79); Shared understandings (p82)

## The issue

The comments of the informants involved in this review illustrate the extent to which they recognise that people are the drivers of change<sup>114</sup>. It is people at all levels in any system who are the means by which visions, aspirations and aims become operational realities, whether or not those involve the use of ICT<sup>115</sup>. Thus people are central to the e-strategy implementation, for no amount of technology will bring about the transformations that it calls for without the active involvement of teachers<sup>116</sup> and other people at all levels in the education system and related sectors.

Those involved in education have shown in recent years not only their willingness to accept changes but also their capacity to implement them in a 'selectively welcoming way'<sup>117</sup>. Change on the scale that the e-strategy implies is complex and challenging. At the very least it requires that:

- people have reached a minimum threshold of technical competence<sup>118</sup>, because without that they will not be able to make best use of the technology
- people understand what they can do with the technology, and thus realise what its potential is to support learning<sup>119</sup>
- the culture within which people are working is supportive of the kind of experimentation and risk taking that change of this nature entails
- the education systems within which people are working allow for the changes that using ICT entails
- the educational vision inherent in the e-strategy is clearly communicated and understood by everyone involved in implementing and embedding it into everyday practice at all levels of the workforce.

As new technologies are reaching the market with increasing speed, then now – more than

ever – it is important for those involved in the children's workforce to have the requisite skills and understanding to maximise any educational potential. That this will require appropriate support is self evident.

In the early stages of the introduction of ICT into education the technical and pedagogical requirements were less apparent for two reasons. Firstly, the early adopters of ICT tended to be people who were technologically confident and competent. Secondly, they tended to operate on a small scale, which enabled them to avoid many of the systemic constraints that act as barriers to larger-scale adoption of ICT.

When considering the entire workforce, implementation becomes more complex, not least because later adopters – the majority – tend to be less interested in and less confident about using the technology. One of the problems is how to break the 'vicious circle' of educators being unable to see how to use ICT effectively without first using it with learners but, paradoxically, as professionals, needing to see a purpose for using it with learners before being willing to do so<sup>120</sup>. Later adopters may need support to break out of such a cycle. That support needs to address both the functional aspects of operating the technology and the educational understanding of how it might be used in practice to enhance learning (see p79 [Support](#)).

While the senior management team has an important role to play in fostering an ethos that supports change (see p77 [Leadership](#)), it is also clear that the wider educational context plays a vital role as well. At present the culture within education does not encourage people to take risks or innovate<sup>121</sup>. Additionally, many educators in schools are still coming to terms with initiatives that they perceive have been imposed upon them. This can lead to 'initiative blindness' (Interview 26 – LA) which acts as a barrier to further change. Competition, whether real or imaginary, can also act as a barrier, inhibiting risk taking and collaboration (Interview 30 – LA).

A number of additional constraints currently limit people's ability to make effective use of the new technologies that are essential to the embedding of the e-strategy. At the simplest level there is an issue in a number of areas with the lack of availability and

People, people, people. Additional funds are useful but, without the people with the vision and the people to make it all work on the ground and the consensus, it wouldn't happen.  
Interview 37 – LA

accessibility of technological resources. This includes limitations on internet access as a consequence of demand being greater than can be supported by the available bandwidth. Both the literature<sup>122</sup> and interviews confirmed that in some areas broadband access has yet to be achieved (for example Interview 16 – Commercial; Interview 20 – LA). Making time in an already heavy workload is a problem, but for people to engage effectively with innovation and personal development an adequate allocation of time and work space is essential. This appeared to be a particularly serious problem facing staff in the post-16 organisations in our sample, and was seen by interviewees as becoming much more difficult in schools as a result of tightening budgetary constraints and changes related to workforce reforms.

The traditional physical and logistical organisation of schools – including such things as the fabric of the building<sup>123</sup>, timetabling arrangements<sup>124</sup>, class size<sup>125</sup> and institutional rules<sup>126</sup> – also act as barriers to maximising the potential benefits of new technologies for learning and teaching. At colleges, where workload is often based on the number of hours of face-to-face contact, respondents noted a concern that allocating staff time for creating the digital resources essential to support self-study may result in staff redundancies. More fundamentally, as already indicated elsewhere in this report, current assessment frameworks act as a significant barrier to innovation (see p54 **New assessment (including e-portfolios)** and p56 **panel 21**).

### Illustrating the issue

The data from the questionnaires and interviews highlighted that learning platform use is, at best, patchy (see p31 **Learning platforms: Implementation and uptake**). In order for institutions to make effective use of a learning platform, the technological infrastructure and supporting arrangements must be in place and educators need to know about the facilities available and how to use them. The interviews provided examples of problems with each of these aspects of learning platform use, either individually or in combination. For example, the low level of educators' technical skills was specifically highlighted as a barrier to effective implementation by a small number of the interviewees (for instance Interview 26 – LA; Interview 23 – FE). A larger number identified how

staff in schools, including members of the senior management team, did not understand the varied ways in which a learning platform might be used, and so were questioning why they might want to invest in one (Interview 38 – CLC; Interview 45 – LA; Interview 43 – FE). It was clear from the data provided by informants that in most cases the communicative functionality of learning platforms was not being used extensively. Several interviewees identified that these components of the learning platform had been disabled because they were perceived by staff as 'causing problems' (Interview 20 – LA), for example, or '... they are a bit young, and they got off topic so it [the discussion area facility] was turned off ...' (Interview 12 – FE).

### 'Solutions' being implemented

A widely recognised way of enhancing people's engagement with new technologies is to provide them with 'ownership' of their own mobile device (see p46 **panel 16**). Having 'your own' laptop or PDA can help you to increase IT competence and confidence in yourself as an informed user. Such ownership allows people to become involved with the affordances of the devices and so to develop increased understanding of the ways in which students' learning and professional activities can be enhanced. Teacher or lecturer ownership of mobile devices was something that many respondents identified in the questionnaire that they had achieved (23%) or were working towards (44%), though there were differences across pre- and post-16 respondents (see p44 **Mobile devices: Implementation and uptake** for more details). Providing staff ownership of a mobile device was seen as being an effective approach to embedding e-learning, which had many practical benefits for staff, sometimes making the mobile device indispensable (for instance Preliminary interview 2 – LA). Several respondents highlighted the value of providing educators with a mobile device in conjunction with a data projector and learning platform in order to maximise use in a range of curriculum areas (for example Interview 16 – Commercial).

Collaboration, a crucial aspect of the e-strategy (see p32 **Collaboration**), was strikingly recognised within the interview comments as being an important way of acknowledging and overcoming some of the 'people' issues identified earlier. Our informants

We need to get people to stop concentrating on technology and concentrate on learning and teaching – that's the hard bit. It's the change management in schools that's important. It's the people – it is not about teachers having laptops: it is about them understanding the change in their roles that engaging with technology offers. Interview 46 – Commercial

saw collaboration between people engaged in joint enterprise as being essential at a number of differing levels. A range of different forms of collaboration were used at school and college levels to support staff in learning how to use new technologies in their teaching, including the use of mentors or 'champions' (this was particularly the case for the post-16 phase). Similarly people working together in collaborative teams within institutions, which sometimes included software developers and designers working alongside teaching staff to develop activities and resources, was seen as providing a positive solution (see p25 [Example 2](#)). Collaboration between people based in other schools or colleges in order to share expertise and resources was also considered a worthwhile way of producing gains (see p33 [Example 4](#)).

A number of informants noted how working with a CLC, whose staff have the time 'to keep in touch with all the national stuff and interesting innovative stuff that teachers never have time to find out about' (Interview 38 – CLC), produced positive outcomes. CLCs were regarded as offering educators a neutral setting and technical guidance if and when required that provides opportunities for 'innovation and experimentation in a low-risk supportive environment' (Interview 42 – CLC). Collaboration at a regional level, across multi-disciplinary teams and between individuals located at the various interfaces between institutions and organisations was also commented on as a key consideration (see p60 [Example 12](#)). Interviewees noted the importance of people involved in teamwork and in inter-agency liaison having high levels of interpersonal and communicative skills as well as sufficient 'status' to ensure that any decisions agreed are put into operation. They highlighted the need for everyone involved to have a clear and coherent view of their own roles and responsibilities.

### **Strength of the evidence**

The importance of focusing on people in order to be able to maximise the potential benefits of the use of new technologies in implementing the e-strategy is one of the strongest threads coming from the data and the literature. While some of the system issues identified above – access to broadband, for instance – related more obviously to schools than to FE colleges, the importance of people was a consistent message across all of the interviews, and was seen as

paramount by the majority of respondents. However, the literature highlights the constraints that the current focus on accountability, defined narrowly in terms of specified learning outcomes, places on the scope for risk taking<sup>127</sup>, and some interviewees explicitly identified this as a major block to progress.

### **Areas for further research/development**

Further work is needed to understand the most effective ways to encourage and support staff, particularly those in senior management, to engage with ICT. This might include investigating the impact of CLCs or of the recognition and accreditation provided by the Naacemak and ICT Mark schemes. It might also examine the effects of strategies such as incorporating requirements to engage with ICT as part of staff appraisal and review processes. Similarly, ways of overcoming disincentives such as basing workload calculations on the number of hours of face-to-face teaching, as practised in many colleges, need to be explored.

Remember the emotional cost. Don't underestimate the people. You need to win hearts and minds – back away a bit from the technology bit. Resources and delivery models can be easily defined, but what often gets forgotten is the emotional cost to the users. It is a big change and users have to take risks and sometimes quite public ones. The people factors are not just in relation to training: it is SMT support, engagement and encouragement that is also vital.

Interview 16 – Commercial

The current statutory framework is a real problem for innovation – schools are in a competitive environment: exam results, bad publicity, not filled up on first choice, more difficult children, vicious downward spiral... schools won't take risks in this kind of environment.

Interview 38 – CLC

The schools are just overwhelmed with initiatives.

Interview 17 – LA

... In [LA name] we don't innovate – we can't afford to do that – can't take risks – won't take risks on pupils' learning. Until something has been proven to have an impact on pupils' learning we are not interested. We want proven solutions.

Interview 29 – LA

Tutors will see it as an extra burden. And does this time come out of contact time, such as in monitoring discussions, or is it planning and admin time, or is it out of their own time?

Interview 12 – FE

CLCs are high-tech/multimedia bases that serve secondary and primary schools, community services etc. They provide cybercafés, seminar rooms, ICT suites and equipment and other technical materials plus tutors and support. They are a vital link between policy and practice and they are the link between sectors and very important for the e-strategy nationally. ... For us the CLCs were essential.

Interview 37 – LA

... securing connectivity to schools, for example hard-to-reach schools. As we move into the last phase of connecting schools, these are the hard to reach and so are more expensive solutions – they're rural, small or urban hard-to-reach schools. (Urban hard to reach tends to be partly due to high take-up of phone lines in the area, and so lack of cable capacity to add the line in. In rural hard-to-reach areas, the infrastructure just isn't there, so it's the distance from the exchange to the school.)

Interview 7 – RBC

Absolute clarity of the vision of your infrastructure – in terms of across the college... In some places I have seen excellent practice in little pockets, but it has no impact or by the time it has an impact, things have moved on. Our approach is to build infrastructure, simplicity, robustness. Pedagogy is vital too – we went with technical infrastructure first. (No amount of pedagogical understanding will overcome the technology not working.)

Interview 43 – FE

### Introduction

In order to ensure the effective implementation of the e-strategy, it is essential to ensure that 'buy-in' by all those involved in education is achieved in terms of the overall vision for enhancing learning through the effective use of new technologies, as well the practical strategies required to embed it into practice contexts.

*Related key implementation issues: Focus on people (p70), Leadership (p77), Complexity (p66), Shared understandings (p82)*

### The issue(s)

For our informants it is clear that, for technological change to be incorporated within education there has to be buy-in at all levels within the system. Buy-in, which is often talked about in terms of 'ownership', is important in the introduction and management of change processes in order to ensure that people – the key to innovation – are convinced of the benefits they will gain from being involved with and committed to the initiative. It is recognised that, without this ownership, the anticipated changes may be subverted, undermined or blocked<sup>128</sup>.

Achieving buy-in requires, at the very least, that those who are expected to implement an initiative can see how it addresses their concerns<sup>129</sup>, solves real problems<sup>130</sup> or in some other way provides real benefits<sup>131</sup>. Top-down innovation has often failed in the past because it ignored the concerns of the people 'at the chalk face' and expected commitment without giving due consideration to the needs and aspirations of those asked to embed the changes<sup>132</sup>. This is especially true when the changes are as complex as those being considered in relation to the e-strategy. Attempting to implement too many initiatives at once is also counterproductive<sup>133</sup>.

Schools and colleges are complex systems, and new technologies and the ways of working they entail interact with those systems in complicated and often unexpected ways. The people who are best placed to understand the practical implications of the introduction of particular technologies are the people working within those contexts. Thus local involvement in decisions about new technologies is essential. Local involvement in, and control of, decision making increases the degree of ownership and active participation<sup>134</sup>, which increases commitment to making the change succeed. However, such active

involvement takes time, requires informed leadership, clear communication strategies and interpersonal skills of a high order.

### Illustrating the issue

The introduction of internet access for learners provides a useful illustration of some of the issues clustering around the concept of buy-in. For internet work to be incorporated into the educational practices of learning and teaching, at the most basic level the technical infrastructure needs to be securely in place. This requires, for example, key decisions to be made about how many learners should be able to access the internet at any one time, and the places where and the times when they should be able to access it.

Decisions of this sort clearly have financial implications, but will also affect timetabling and room/equipment bookings. If gaining access to the internet creates extra demands on educators' time – for example in negotiating room bookings – then they may not use it. At a more complex level, decisions need to be made about ensuring that learners access only appropriate material:

- Who should define what is appropriate?
- Should inappropriate material be blocked, or should learners be taught how to deal with it maturely?
- What form of home/school agreement should be in place?
- If conflicting views about internet use arise, how should they be accommodated? For example, how should one respond to a parent who says that their child may not use the internet?

The impact of providing internet access on the role and status of teachers is even more complex and subtle and therefore requires a still greater degree of buy-in. The internet has the potential to give learners access to huge quantities of information and additional sources of expertise, thus altering the nature of the educator's status in the class. A consequence of no longer having control over the flow of information moves educators from being 'the expert' to being one among many sources of expertise. As a consequence, they may no longer be seen as 'knowing the answer' and may even on occasions be perceived as knowing less than the people they are teaching. This is part and parcel of

There is the danger that regional work is done but doesn't encompass ownership of the various potential stakeholders and so isn't adopted. Interview 11 – RBC



what has been described as a move from being 'the sage on the stage to the guide on the side'<sup>135</sup>. Some teachers may find this threatening and, without the requisite buy-in, may attempt to limit student access to the internet as a result.

### **'Solutions' being implemented**

Where interviewees' organisations had been successful at achieving buy-in to their goals, their comments made it clear that a great deal of effort had been devoted to achieving this, although the effort was perceived as worth while. Several interviewees noted the importance of early adopters and innovative schools that could both pilot use and provide evidence of the benefits. A small number of interviewees offered incentives to encourage early adopters to take on such a role, for example by awarding 'exemplar status' to schools, which raised their profile in the authority (for example Interview 31 – LA).

Beyond the piloting stage a number of strategies were used to increase buy-in. These strategies ranged from working directly and supportively with educators so that they could see the advantages of using a particular technology in a specific context, to developing exemplars (sometimes in the form of video case studies) of how teachers have used the technology effectively, which could then be used to disseminate information about practical approaches (Interview 43 – FE; Interview 31 – LA, for instance). The key, however, was to show that the technology would meet a real need that the prospective user had (Interview 11 – RBC). This required a good understanding of what those needs might be and the practical contexts in which potential users of the systems were operating. Several interviewees highlighted the danger of assuming that you understood the user perspective or of ignoring the context in which they were operating (for example Interview 13 – FE; Interview 33 – Other).

While good communication was seen as crucial to ensuring buy-in (Interview 8 – LA; Interview 17 – LA, for example), many of the more effective implementations went further than this and developed collaborative ways of working which engaged as many potential stakeholders as possible (such as Interview 17 – LA). Involving educators in working together as part of multifaceted teams was recognised as very effective in creating commitment and buy-

in to the project. Collaborating to develop digital resources for use within a learning platform appeared to be particularly effective and had the added benefits of providing valuable staff development as well as producing high-quality materials which met the needs of users (for example Interview 13 – FE; Interview 14 – RBC). Staff time often had to be bought out to make this sort of collaborative development possible, yet the investment was considered cost effective (see p60 **Example 12**).

Establishing realistic, manageable and achievable targets for the implementation of any changes was something that many respondents regarded as important. Implementing changes was done either by limiting the scale and/or scope of any new initiative or by starting with a pilot project followed by a staged roll-out (for example Interview 8 – LEA; Interview 15 – FE), or by focusing first on a subset of the available functionality and later adding in new features as the users recognised their need for them (see Interview 7 – RBC). Another approach that appeared to be particularly effective was to ensure that all activities were aligned to one overarching goal (Interview 36 – LA, for instance). There was agreement that there needed to be a reduction in the number of initiatives undertaken by schools/colleges and that this required a reduction in the overall number of initiatives and an alignment of policies and action plans at both local and national levels.

### **Strength of the evidence**

There is strong recognition, both in the literature and from the phone interviews, of the importance of stakeholder buy-in. This message was consistent across all the interviews and none of the interviewees disagreed with its importance.

### **Areas for further research/development**

Further work is needed to identify the most effective ways to enhance staff engagement with strategic technological initiative and ownership of it, particularly when these require changes in pedagogy.



If you don't take the people along with you, no matter how 'whizzy' the kit is, it won't be used. You have to show people what it will do for them – the internet moment – it can do something for you that you couldn't do before.

Interview 29 – LA

Pupils are so ICT aware that they need to see what you are providing as valuable, something which makes them want to go back onto the system, use resources at home and show their parents.

Interview 8 – LA

The main problem has been that there are so many government initiatives that sometimes people don't get the momentum going, and when other priorities come along they take precedence, so there is a need to continually review progress.

Interview 31 – LA

## Introduction

Leadership is vital for the effective implementation of the e-strategy. Leaders were identified as playing a key role in developing shared visions, creating an ethos to support innovation and risk taking, ensuring effective use of resources, and co-ordinating activities. All of these are essential to enable the transformation of education with the aid of ICT.

Related key implementation issues: Focus on people (p70), Complexity (p66), Shared understandings (p82), Buy-in (p74)

## The issue(s)

Members of senior management teams in educational organisations fulfil a number of important roles in supporting the effective introduction of new technologies in education, and are the focus of Priority 5 of the e-strategy. Senior managers lead the strategic development of their organisation, which entails having a clear set of goals underpinned by an educational vision. Implementation of the e-strategy thus depends on senior management buy-in to the role that ICT can play in enabling their educational vision to be realised. Senior management buy-in, however, requires that SMT members have sufficient understanding of the ways in which new technologies might be used in order to be able to see how the functionalities these offer relate to their strategic educational vision. The active involvement of senior management plays a crucial part in the successful implementation of change within their organisation.

Where senior managers lack the commitment required to lead educational change, then it is clear that they have the power to block effective innovation, for example by withholding funding for equipment. However, they can also block it through lack of active engagement. This is because of the scale and complexity of change that implementing the e-strategy entails. It requires co-ordination and alignment of resources, not only in terms of the technological infrastructure, but also in terms of providing the time and space for staff to explore the potential of e-learning. Furthermore, senior managers need to create an ethos in which collaboration, experimentation and risk taking are encouraged, recognised and rewarded. Using new technologies in the ways envisaged in the e-strategy is complex and for staff the difficulties, both pedagogical and technological, of implementing them in practice

should not be underestimated. Effective leadership is therefore essential.

## Illustrating the issue

The successful embedding of a learning platform is heavily dependent on the active engagement as well as the buy-in of leadership teams. For example, leadership is needed to decide whether the learning platform should support traditional practice, perhaps being used in conjunction with an interactive whiteboard to enhance teachers' whole-class teaching, or to enable radical changes to pedagogy, for example moving to student-led research and collaboration facilitated by adults wherever and whenever necessary. Leadership is then needed to ensure that everyone involved has a shared understanding of the educational vision, and has the motivation, resources and support necessary for them to play their part in achieving it.

## 'Solutions' being implemented

Interviewees outlined a number of strategies that were being used effectively to ensure the active involvement of senior managers in the implementation of e-strategy initiatives. Schemes at a national or regional level using certification or awards to provide public recognition for a school's use of new technology, and by implication for the quality of its leadership, were seen as a useful way to encourage senior management teams to engage more fully with the implementation of new initiatives. This was particularly valuable where the senior management team's involvement was necessary in order to gain the award (as for the Naacemak or ICT Mark, for instance).

Moving to paperless communication, for example by providing important data via the learning platform, was also seen as a successful way of getting senior managers (and other staff) to make use of these systems in their own everyday work. The expectation here was that this would enhance their personal competence with new media, giving them a greater understanding of the potential that the technology offers. Not surprisingly, when electronic communication became the only way of accessing important information, the level of usage was higher than when the information was also available on paper.

Regular provision of strategically important information to the senior management team was a technique used by one of the commercial

In schools it is absolutely essential to engage SMT, who must be committed to the transformational change that is involved. This is the same in SMEs too. Even when there is work coming from the ground up, this is not of itself sufficient: there must be that backing at the highest level. Interview 16 – Commercial

.... a quick win ... reverse strategies in colleges – for example the ILT strategy, so it's not focused on the technology but on the learning – and then thinking about the most effective way to achieve that. ... Thinking about money is not a dirty word – ICT can save money.

Interview 43 – FE

We have a course on [name of VLE] for business planning for 2006–7, meaning all SMT will be engaging actively with it [the learning platform] as a student effectively. I'm writing an ILT strategy course and I'm reviewing our current strategy at present. I'm using the VLE as a channel for that. All SMT members have been enrolled onto that course. There's always a complaint with such ventures that you don't get the SMT engagement, and if this is the case you don't get the resources to enhance the roll-out of e-learning, mostly due to cost. It has to be a priority for SMT so that, in costing the action plan, the resources needed are on the agenda. This therefore is an opportunity: in reviewing the ILT strategy we are trying to engage all SMT to get their support and make it a real college strategy and not an 'add on'.

Interview 39 – FE

Make SLICT compulsory for new heads, heads of academies, heads of new school builds, and a compulsory part of NPQH.

Interview 29 – LA

Controversially, teachers [are the key barriers]. Their involvement and engagement is not pivotal in pupils using it, but if the senior manager doesn't believe [name of system] is a good thing, it won't get used.

Interview 35 – Commercial

respondents, who described how they sent monthly reports to a named member of the senior management team in each school where their system was in use. These reports provided data about the relative academic performance of the school's students relative to students in other schools. In contrast to the previous example, the intention here was to enhance the commitment of the senior manager to continue to support (and fund) the use of the system by students, rather than to engage managers in using the system themselves.

An important approach to gaining the active support of members of the senior management team was to engage strategically with them. It was argued that members of senior management teams recognised that failing to engage with new technologies was not an option, which meant that they were open to anything that helped them understand how ICT might help them meet their strategic goals (Interview 43 – FE). This might explain the reported success of SLICT, which is a staff development course specifically aimed at headteachers and senior managers in schools. SLICT was seen as having had a particularly significant impact in LAs where a critical mass of heads had completed the course. However, it was also noted that SLICT should only be seen as a starting point because, as one respondent commented, it 'barely scratches the surface' (Interview 40 – Other).

### Strength of the evidence

The vital role of senior management in actively supporting the implementation of their organisation's vision was one of the strongest themes emerging from the interviews on the key factors enabling success. Lack of senior management engagement was equally likely to be identified as a key blocker to implementation. The importance of leadership to effective innovation is also strongly supported in the literature<sup>136</sup>.

### Areas for further research/development

Further work is needed to explore the impact of schemes such as SLICT, in order to inform future staff development for senior managers and the development of communities of practice focused on the embedding of ICT in education in order to enhance learning in the 21st century.

## Introduction

It is essential that 'the technology' enables users to do what they need to do at the time and place they are intending to use it. Support, in its various aspects, provides the underpinnings which make this possible.

Related key implementation issues: Focus on people (p70), Buy-in (p74), Leadership (p77)

## The issue(s)

There are three aspects to support that need to be in place to enable truly effective use of ICT in education.

- Firstly, there must be a robust technical infrastructure<sup>137</sup>. Without this essential basic pre requisite, the implementation of Priorities 2 and 3 of the e-strategy cannot be accomplished. Teaching staff must be able to rely with confidence on the technology working<sup>138</sup>, otherwise few will risk using it in their teaching. When there is a risk that the technology is not trustworthy, educators face a situation which requires them to engage in a process of continual 'double planning', which at best is an inefficient use of professional time and at worst blocks staff from attempting to use ICT in their teaching.
- Secondly, there must be just-in-time support at the point of need<sup>139</sup>. If any new technology is being used as an integral part of a session and the equipment fails or problems arise, the teacher cannot ignore the problem until later or leave their students in order to go in search of a solution: support must be available when and where it is required.
- Thirdly, staff must be given opportunities to engage in continuing professional development in order to learn how to use new technologies<sup>140</sup>. This needs to include how to operate the technology, in the sense of 'knowing which buttons to push'.

However, such technical competence should be developed in the context of learning about how to use that technology to enhance practice within the user's area of responsibility. Staff need to understand the pedagogical aspects of using the functionalities of the technologies available to them. Such professional development is most effective when it is:

- based in the context within which the staff work<sup>141</sup>
- over a long time frame<sup>142</sup>
- building on the expertise of teachers<sup>143</sup>

- providing teachers with 'opportunities to discuss, think about, try out, and hone new practices'<sup>144</sup>
- seen as being of practical value to themselves<sup>145</sup>.

## Illustrating the issue

For an interactive whiteboard (IWB) to be used effectively, a basic prerequisite is for the equipment to be installed in a suitable teaching space in a way that makes it accessible to users. This includes ensuring that the board itself is mounted at an appropriate height on a wall that users can access: there are still primary classrooms in which children (and occasionally teachers) cannot reach the top section of the whiteboard. The educator then needs to be able to operate the IWB comfortably – including the data projector, computer or PDA and any software. The educator needs to understand how to integrate the use of the IWB into the curriculum area and specific session and also to decide if it will be used:

- for a whole-class session
- by a group, or by one or two students
- by the teacher alone or also by students
- by students coming up to the board and, if so, how their movement around the classroom is to be organised
- for a variety of forms of activity best supported by the IWB such as presentations, question-and-answer sessions, interactive quizzes, information handling and so forth.

Evidence from the interviews suggested that given sufficient time and space to explore and share experiences of using their IWBs, educators typically progressed through a number of phases of use: initially using the boards as presentational devices, with an associated increase in whole-class teaching; enhancing the diversity of resources they used; increasing interactivity, including more focus on effective questioning strategies; movement away from whole-class use to use by small groups. However, support to develop both pedagogical and technological confidence and competence was essential in order for these developments to take place. Effective strategies included providing opportunities for collaboration and sharing experiences, and time to experiment and reflect.

... good equipment and a reliable infrastructure – that is to say it is doing what it is supposed to do. If staff find a problem, they will not use it and getting them back on board is then really difficult. Interview 28 – FE

### **‘Solutions’ being implemented**

Most respondents saw technological infrastructure that worked well as a basic prerequisite for successful implementation of Priorities 2 and 3, and this is the focus of Priority 6 of the e-strategy. Our interviewees often mentioned the problem of staff (and to a lesser extent students) being put off and then being hard to woo back if a system failed. The interviewees also felt that the technology needed to be accessible – both in terms of being available when and where users needed it and in terms of being ‘user friendly’. There was a concern that many of the people involved in implementing ICT-based systems were out of touch with how unintuitive their systems were to ‘ordinary’ users. Providing just-in-time support was seen as a critical element of ensuring that the technology worked.

Professional development, which is the focus of Priority 4 of the e-strategy, was central to many of the interviews, though references to it – particularly in the pre-16 phases – were often couched in terms of providing training. The emphasis throughout was on pedagogically-focused staff development, though the importance of teaching staff having the necessary ICT skills was also acknowledged. The most effective professional development not only focused clearly on the specific needs of the staff concerned, but also provided a safe space in which to share expertise with colleagues who understood the pedagogical issues. Specific examples that appeared to work well included:

- staff from a CLC working alongside teachers exploring different ways in which they might use a range of new technologies in their day-to-day practice
- ILT champions working alongside colleagues in college
- teaching staff working together, supported by developers, to create digital resources that could be used with a VLE and/or interactive whiteboard.

Working collaboratively rather than competitively or in isolation was seen as being important.

Major barriers to professional development that were identified included the current competitive climate in education and the restrictions imposed by the curriculum and by highly-staked assessment frameworks, which tended to obstruct a culture

that supported experimentation, risk taking and innovation (see p56 [panel 21](#)). Lack of staff time to engage with professional development was also considered a major barrier to the implementation of the e-strategy.

### **Strength of the evidence**

Although a robust technical infrastructure was deemed essential, there were differences in emphasis between pre- and post-16 organisations. Post-16 interviewees tended to place greater prominence on providing a robust technical infrastructure, while the pre-16 ones tended to stress the need for the technology to be intuitive and user friendly. This may reflect the fact that the post-16 sector appears to be at an earlier stage in embedding ICT into learning and teaching, as strategic investment has not yet provided an adequate technical infrastructure in many colleges.

The importance of pedagogically-focused staff development was a very strong thread throughout the interviews and also supported by the literature<sup>146</sup>. In the post-16 interviews there was almost universal agreement about the importance of the ILT champions. The small number of people who had experience of working with the CLCs were all strongly supportive of the role these played, and two other interviewees felt that they were disadvantaged because they did not have access to a CLC.

There was widespread agreement in the literature and our data about the importance of staff having the time<sup>147</sup> and space to experiment and take risks, and concern about the lack of scope for this. Lack of staff time seemed to be a growing problem, particularly in the pre-16 phases.

### **Areas for further research/development**

Further work is needed to explore the most effective forms of support and staff development, including such questions as:

- What impact have the CLCs had on the implementation and embedding of ICT in schools?
- How cost effective are ILT champions, and is this a model that the schools sector could use effectively?
- Would greater support for practitioner research have a significant impact on staff engagement in and ownership of strategic ICT initiatives?

### Capacity to manage ICT systems

– technical support and money to replace equipment quickly if it fails (for example ink cartridges), and effective systems for managing it (schools need tight control over change in technical systems). In the classroom, if kit doesn't work, then it will be a long time before the teacher will risk it again. Teachers also need the skills.

Interview 38 – CLC

Supporting the users – because everything else could go like a dream and arrive on schedule and on budget, but if people aren't confident to use what's provided, you've effectively wasted your and their time.

Interview 24 – LA

Use teaching skill to move the agenda. Technology skill is a turn off. ... Hit the most difficult people first – don't worry about the ones who are going to be keen (because they will do it anyway). Show them how it will solve a problem for them. For example ... in travel and tourism they now access websites during sessions in order to find 'real life' statistics which helps make the subject more interesting, and this was an area that they found hard to deal with in the past.

Interview 43 – FE

The initial training programmes were wrong – we tried to teach everything about VLEs all at once rather than just what people needed to get started. There needs to be an individual or at least a school level of training.

Interview 37 – LA

We've tended in [Name of LA] to focus on supporting teachers. We're using a Trojan horse approach: we encourage teachers to use it [the learning platform] with their class, the kids are very keen, and then the teacher feels they need to use it more. Teachers still have ownership. The teacher might use one facility – for example setting an onscreen test – but they don't realise that the kids will explore other options.

Preliminary interview 14 – LA

For some teachers the most powerful technologies give them more power to do what they used to do in traditional way – for instance IWBs are blackboards with bells and whistles. There is some progression – confidence with the IWB for writing on and showing pictures leads onto more radically different kinds of work. For instance in a training session one of the teachers talked about how she used it to draw something, and then bring it up again; she started to explore the features of IWBs, and to see lots of new things she could do.

Interview 38 – CLC

There's a problem with the workload for teachers. It's a constant struggle with heads to get teachers out of the classroom: the present workload agreement is a minimum for marking, let alone preparation. There's not enough time for teachers to develop their skills – to be professionals.

Interview 38 – CLC



### Introduction

Shared understandings, visions and vocabularies are vital for the successful implementation of strategy. However, such shared understandings are not easy to achieve.

Related key implementation issues: Complexity (p66), Buy-in (p74), Leadership (p77)

### The issues

Mintzberg<sup>148</sup> reminds us that for a strategy to be effective there must be:

- consistency in actions (across sectors and through time)
- transparent integration between initiatives
- clear links between targets and actions.

Having an overarching vision that informs and directs strategy is one way of meeting these three conditions. However, this will only work if the different actors in the system:

- share the vision
- understand and interpret the vision in the same way
- share a common vocabulary to debate and implement the vision.

There is widespread support for the view that we need to have a shared vision informing our use of ICT in education. However, many researchers and commentators believe that there is a lack of shared vision on the role of ICT in education (see p42 [panel 15](#) and p83 [panel 26](#)).

### Illustrating the issues

The issues which arise from not following a consistent pattern of actions were recognised by some respondents on the basis of their experience. For example some organisations had 'just been following initiatives, adding equipment when funding allowed' (Interview 8 – LA) and not embedding change in any significant way. It is also necessary to 'sell' the overall strategy to schools (Interview 4 – LA).

Many respondents highlighted funding issues. Some interviewees argued quite strongly that uncertainties in the duration and direction of funding threw long-term sustainability of initiatives into doubt (for example Interview 14 – RBC). Fears about sustainability also occur at schools level (Interview 37

– LA). There was a tendency to see initiative funding as 'soft money' and thus respondents felt little confidence that initiatives would be mainstreamed (or 'embedded') once funding priorities changed. Funding decisions are the most important levers of strategy implementation, so it is important that they are seen to have a coherent pattern and not to be a short-term 'fix'.

However, we found many instances where 'patterns in decisions and actions' were present. Projects were linked together by an overall educational vision (in practice as well as rhetoric) – for example extending access. In these cases there was no 'one big hit scheme' but a progressive move towards achieving a longer-term aim. This extended to the possibility that potential funding streams might not be followed up if they diverted effort from achieving the overall mission (Interview 36 – LA): the tactics for achieving that aim might change as different initiatives emerged, yet the overall strategy remained constant. However, it should be noted that this may not help those involved in particular initiatives which could be vulnerable to funding shift, for example City Learning Centres (for example Interview 42 – LA).

The changing relationships between LAs and schools can create tensions (Interview 7 – RBC). One consequence of the increasing autonomy of schools is that some risks may be shifted from the LA to individual schools that may be less able to manage them. Some concern was also expressed at the potential diminution of the role of LA as 'strategic leader'. Some decisions are strategic for a system as a whole and cannot be delegated, although they could be taken at a higher level in the system (by an RBC or at national level, for instance, rather than by the LA). However, it is also important to remember that many schools welcome their increasing independence.

Development programmes for senior managers seem to produce marked positive effects, provided that a large enough proportion of them attend the same programme; figures for critical mass ranged between 25% and 50% of senior managers within the LA. Such programmes help to establish a common vocabulary and understanding of issues, which is a prerequisite for achieving system-wide change. In particular co-ordinated use of the SLICT programme was reported as having had significant impacts (for example Interview 4 – LA; Interview 31 – LA; Interview 36 – LA).

The lack of shared vocabulary (including understandings of terms such as personalisation, embedding, transformation, VLE, MIS and so on) emerged when our telephone interviewers sought additional information on answers to the web questionnaire. When we asked respondents to give us examples or explain what was happening 'on the ground', we received a wide range of responses (see for instance p25 **Learning platforms: Gaps and other problems**; p29 **MIS: Gaps and other problems**; p56 **New assessment: Gaps and other problems**).

### 'Solutions' being implemented

The key elements of successful strategies were seen to be:

- To engage as many people as possible and build a dialogue between them (for example Interview 4 – LA)
- Ensure that the people issues are put first and concentrate on promoting developments in practice generally, rather than concentrate on the functionality provided by the technology (see p70 **Focus on people**)
- Focus on gradual improvements and build outwards (for example Interview 5 – LA)
- The vision comes first but needs continual re-checking against possibilities opened up by shifts in technology (for example Interview 8 – LA)
- Tactics for creating belief include sharing success stories on film (for example Interview 11 – RBC), sharing local case studies (for example Interview 19 – RBC) and promoting exemplars (for example Interview 31 – LA), including ones from early adopters (for example Interview 44 – LA).

## 26 Shared visions

Trilling and Hood (2001), drawing on the work of Stewart (1997), assert that the USA moved out of the industrial age and into the knowledge age in the early 1990s. This shift was accompanied by widespread calls for educational change, often seen as fundamental transformation, throughout the world (Paine 2003). Pelgrum (2001 p163) described calls of this kind as 'wild speculations about the necessity of educational reform' in order to ensure survival in the information age.

Such calls for reform were accompanied in England and many other countries by extensive investment in the ICT infrastructure supporting education (Twining 2002b). However, these investments failed to have the impact on education that reflected their scale (Cuban 2001; Twining 2002a). This led to calls for a moratorium on further investment in 'educational' ICT (Stoll 2000; Cuban 2001) and raised questions about the causes of this failure to deliver (Cuban 2001). Pelgrum claims: 'There is, as yet, little consensus in societies about what these new pedagogical models should encompass' (Pelgrum 2001 p165). Twining (2002a) identified that the lack of a shared vision about what the reform attempts were trying to achieve was one of the causes of the failure of investments in educational ICT to have adequate impact.

The importance of having shared visions is widely recognised in the literature, both in relation to commercial organisations (Peters and Waterman 1995; Kotter 1996; Senge et al 1999) and in education (Fullan 1992; NCSL 2003; DfES 2004), particularly where this involves significant change (Gilbert 1996). The National College of School Leadership (NCSL), in its training materials for aspiring headteachers, points out:

*'The 'vision' is a rather grand way of describing what a school sees as its purpose. It represents the aspirations of the school and summarises*

*what it would like to achieve. ... The vision is a 'preferred future' – the school as we would wish it to be. ... At an everyday level, vision is found to work. Repeatedly, inspections of schools and educational research have shown that the school's vision is important in determining its success. This is not surprising: where a group shares a common purpose it achieves more than if its members go in different directions using sundry methods to achieve ends to which only a fraction of them aspire. The essence of leadership and team building is to serve a common purpose. To work in harmony with similar methods, shared approaches and common goals increases the effectiveness of the group.'* (NCSL 2004 p7)

In the context of a complex educational system it seems logical to conclude that the need for shared understandings is even greater than it is within individual schools. This is a necessary precursor to developing synergies between the diverse strategies developed by the DfES.

Conlon (2000 p116), while supporting the need for educational change in the light of new technologies, identifies the importance of vision in this context: 'The introduction of new technology will change our schools. But technology without philosophy is blind. Unless it is harnessed to a clear vision of change then, chip by chip, the technology could take us into a future that we would never willingly have chosen for ourselves.' Barton (2001 p29) endorses this view when he says: 'We tend to discuss technology as a separate matter, not as one piece of the education puzzle. ... there can be a disconnect between content standards, curriculum, technology and tests. When this happens, technology may not be effective.' Conlon (2002) reiterates the importance of having a clear vision and highlights that this needs to be an educational rather than a technological vision.

Referred to in Key implementation issues: Shared understandings

ICT will play a central role in [LA name] in delivering on our vision of a borough-wide campus. It will support, enhance and transform teaching and learning. Further, ICT will play a major role in shaping the approach to school leadership and management, will support, encourage and enable parental and wider community involvement and will contribute to the improvement of the health and wellbeing of students and school staff. Effective deployment and use of ICT will also contribute to the successful implementation of the change agenda, including remodelling of the workforce and the drive towards schools as the learning hub of a community.

Web questionnaire 44 – LA

Learn how people work and make sure the system works for them, rather than the other way round.

Interview 5 – RBC

## 27 The importance of lifelong learning

The e-strategy highlights the importance of lifelong learning. This emphasis pervades much of the discussion about how life is changing in the information age (Pelgrum and Anderson 2001; Trilling and Hood 2001), and it is evident that a primary aim of education should be to support and enhance lifelong learning, where lifelong means cradle to grave (Hargreaves 2004; Paine 2003). However, it is also clear that lifelong learning is not currently a central focus of the visions of our web-questionnaire respondents' organisations: only 60% of respondents included it within the top five aims, and even where it was included it tended to be the fourth or fifth most important aim. Children's ability to learn and their enthusiasm for learning needs to be fostered from the earliest possible age if they are going to choose to carry on learning once they leave formal education (Hargreaves 2004; Longworth 2004).

Referred to in Key implementation issues: Shared understandings

Good management practice is required to ensure positive educational outcomes. The most successful organisations typically plan over five years and have well-developed systems for benchmarking and monitoring progress (for example Interview 4 – LA). There was broad recognition that time scales were long and that there were now few quick wins. This reflected the switch away from providing infrastructure, connectivity and content towards trying to achieve both fundamental change in pedagogic practice and also opportunities for varied forms of learning (for example Interview 11 – RBC; Interview 17 – LA; Interview 20 – LA).

Linking policy to practice (or decisions to actions) was an underlying theme in many interviews. Clearly training and development is one aspect of this. Publicising successes, providing case studies and exemplars are others. However, respondents also identified the importance of providing vehicles such as City Learning Centres to promote the link (for example Interview 37 – LA).

### Strength of the evidence

We asked respondents to describe briefly the core aspects of their organisation's vision that they were supporting through the use of new technologies (the organisation's 'new technologies vision'). These varied from predominantly technological visions that focused on the provision of a robust ICT infrastructure through to educational visions that highlighted the need to empower learners and break free of the constraints of traditional models of education.

The vast majority of respondents saw ICT as providing a vehicle to enhance learning; 98% chose 'To improve learners' learning' as one of their five most important aims when asked to select from a short list of options (see p51 [panel 18](#)). Many respondents identified the importance of increasing the diversity of actors involved in education, which ranged from providing greater access to education for learners (see p63 [Opening up access](#)), to responding to the 'Every child matters' agenda of increasing collaboration across sectors, through to expanding the role of parents and the wider community (see p32 [Collaboration](#)). On the other hand, lifelong learning did not feature strongly in respondents' aims – despite its being a major feature of the e-strategy and strongly advocated in the literature (see p84 [panel 27](#)).

Across the respondents there was a general move in the directions indicated in the **eSIR reference statement** (Appendix 1 pi), though there was variation both between and within phases.

In addition to the evidence in the literature (see, for instance, p42 **panel 15**) and the opinions of our respondents, the research team looked at a number of strategy documents on respondents' websites. All of these documents started by articulating a vision but the themes of consistency, the long-run nature of the issues and the need for a holistic approach were also common features. However, it seems clear that, across our sample organisations, there is a lack of shared vocabulary and shared vision of the transformations that the e-strategy aims to bring about.

#### **Areas for further research/development**

Further research and development is needed in order to develop shared understandings of how ICT should be being used in order to transform pedagogy, curriculum and assessment. Such work could take the **eSIR reference statement** as a starting point, particularly if informed by an understanding of frameworks for thinking about ICT use<sup>149</sup>.

I've never seen a system [VLE] where students create content in a valuable way – it's difficult for teachers [to create useful content]. If you can't get a basic VLE working (with proper communication) then you can't get to student creativity. This is a higher vision that needs lots of stages and steps before we can reach it .... You must have vision, but you must also have an implementation strategy.

Interview 14 – RBC

Create belief in the schools, especially the managers.

Interview 17 – LA

Having and defining a clear vision, not at a level of detail, but of what you're trying to achieve as outcomes, and of what are defined as the desired impacts. ... A lot of ICT developments are chosen on technical functionality without thinking what do we actually want to do with it.

Interview 20 – LA

## Introduction

Providing and supporting e-learning infrastructure is very expensive, and there is currently evidence of resources being wasted. It is important to deploy effective procurement strategies to give the best value in whole-life cost-and-benefit terms.

Related sections: [Learning platform/MIS integration \(p31\)](#)

## The issue

E-learning provision is characterised both by economies of scale and by economies of scope, although the two are frequently confused in the literature (see [panel 28](#)). The prevalence of economies of scale and scope in e-learning developments favours regional or even national provision, which creates a tension when balanced against the desire to press autonomy, responsibility and funding down to the most local level possible (for example Interview 31 – LA).

Procurement strategies also need to recognise the portfolio benefits which derive from risk sharing. For example, if all schools in an area use different systems, they each individually need to bear the costs of back-up provision and contingency for fail-over. This may mean duplication of hardware at each location. If several schools or colleges use the same system, it is possible to spread the risks of hardware or software failure between users. Thus a procurement strategy needs to take full account of the need for people to accept local ownership

## 28 Economies of scale and scope

Economies of scale are savings which accrue from falling average (unit) costs as output volume expands. Economies of scope are the cost savings which result from transfer of knowledge across different, but related, systems not necessarily deployed in the same area.

Economies of scope are becoming more prevalent in a knowledge-based economy, whereas economies of scale are essentially drivers of manufacturing economies. Economies of scope derive from our ability to manage processes effectively, the exploitation of knowledge-based elements such as reusable learning objects, and economies gained from sharing research, development and specialist knowledge. The concept of economies of scope does not suffer from the same problem of defining 'units of output' as is prevalent with economies of scale. Economies of scope can exist in the absence of economies of scale and may provide a sufficient reason to pursue collective procurement even if economies of scale do not obviously manifest themselves in lower unit prices.

Referred to in [Key implementation issues: Procurement](#)

(based on informed choice of pedagogical needs and system capability), while recognising that obtaining system-wide value for money is also a government imperative. The strategy must recognise whole-life costs of ownership and the relative administrative costs of centralised versus local procurement. The strategy should also recognise the differential risk characteristics contingent on devolved versus centralised procurement arrangements.

## Illustrating the issue

The policy shift towards diversity of provision, particularly at secondary-school level, brings new procurement issues. The sharing of practice (leading to economies of scope) and resources (leading to economies of scale) is made more difficult if schools are resourced at different levels. This may happen, for example, where there are both grammar schools and upper schools (Interview 5 – LA) or where there are different funding, governance and management structures (as with Academies and City Technology Colleges).

The 'not invented here' attitude also plays a part. Some schools or LAs feel that their contexts are sufficiently different as to require their own technological solutions. This can manifest itself in two major but different propositions. In the first case, the argument is that being forced into purchasing an 'off-the-peg' system may result in the need to make so many modifications (tailoring) that a bespoke system would have been better in the first place. The standard system is regarded as being the lowest common denominator. In the second case, it is argued that a system which was sophisticated enough to cover most needs might be so complex and carry so much redundancy for individual users that the overhead for individual users would outweigh any benefits gained from standardisation. The system here is akin to the highest common multiple.

## 'Solutions' being implemented

A variety of approaches was evident in the phone interviews. Some LAs offer a supported turnkey solution which schools could opt in to (for example Interview 5 – LA); in others federated procurement arrangements were developed to exploit buying power without bearing the costs of several layers of purchasing administration (for example Interview 29 – LA). Still other authorities adopted an essentially laissez-faire attitude and concentrated resources



## 29 Waste

There was concern about the extent to which resource was being wasted, often because the people responsible for procurement lacked the necessary knowledge to make informed decisions and ignored advice.

*It's fair to say that if schools buy a piece of software, probably more than 50% of the time it won't be used. This is a problem for schools as they have wasted money, and a problem for suppliers as they won't get renewal business.*

(Interview 35 – Commercial)

*Previously we offered support materials for assessment on CD, but these often only got as far as the ICT co-ordinator's cupboard and/or were only partially used and not reaching or supporting every class teacher.*

(Interview 21 – LA)

*At secondary level, some companies offer equivalent systems on different platforms. Some schools have spent a lot of money setting up an alternative system, only to realise it doesn't do what they thought it would. LAs can advise if approached, but they are not always approached.*

(Interview 31 – LA)

There was a clear feeling that, at the very least, stronger advice was needed about the appropriate use of resources.

*Advice is not enough – must make sure people have the necessary expertise to make sure the money is spent well. There is too much variety.*

(Interview 14 – RBC)

E-learning credits, while identified as very important by at least one supplier and a couple of LAs, were criticised by an equal number of interviewees. It is perhaps significant that where LAs were positive about eLCs, these were always being used to buy 'services' under the direction of the LA.

*If schools buy in directly, it's often by e-learning credits. If an LA purchases it on behalf of schools, it can be eLCs or part of an improvement budget. ... But eLCs are probably the biggest source of funding to buy [system name], whether school or LA driven, and so are very important to [system name]. We totally praise the Government in this strategy, as this gave the push in the market to do the implementation process how we wanted to do it.*

(Interview 35 – Commercial)

*For e-learning credits the development work was done with [company name]. They put up the money and there was some pump priming from the LEA for Key Stages 2 and 3. Schools fund the annual subs from e-learning credits – it is about £120 a school, so a manageable figure.*

(Interview 21 – LA)

*E-learning credits – I made strong recommendations about caches and all schools went for it. We kept back £9,000 to buy in bulk some software for music. With e-learning credits I'd have been happier if schools had only bought online material – lots of schools bought CDs, but these wouldn't run on the network. To shift risk we want software that will run on our system – I have lots of people sorting out problems that shouldn't have happened in the first place.*

(Interview 29 – LA)

Resources also appeared to be being wasted in organisations that were 're-inventing the wheel' or duplicating work already undertaken elsewhere.

*Local authorities are no longer able to exercise strategic leadership. Schools' response to their local authority varies greatly. Several authorities are strong: the services work, email works, and the local authority solution is the predominant solution. In other authorities the capacity of the local authority to act as strategic leader has fallen, and once schools have gone their own way it becomes very difficult for the local authority to co-ordinate and act as leader. ... By this route establishment of common digital infrastructures (Priority 6 on the 'Harnessing technology' agenda) becomes very difficult. There is potential for enormous amount of waste as schools all solve problems independently, which often can't be co-ordinated strategically and so may have to be scrapped.*

(Interview 19 – RBC)

*There's lack of communication between institutions – they need to make sure they're not duplicating work so that pupils and teachers are not doing the same thing twice.*

(Interview 12 – FE)

The extent to which organisations were developing in-house learning platforms and in-house content for their learning platforms also appears to suggest the potential for making significant savings of resource. However, this would demand far more standardisation across organisations than is currently the case.

Referred to in Key implementation issues: Procurement



Most current MIS systems are on site – we want to do an off-site service, tied to the anytime/anywhere agenda. It would be much easier to deliver off site, as this would mean we don't have to maintain countless support services to make all the individual on-site systems happen. Effectively this off-site service would be a central service at, say, local authority level.

Interview 19 – RBC

The number of home-grown solutions suggests that it is probably an immature market. For example, you get enthusiasts in schools who put together learning platforms that suit what they want to do and they don't then easily scale up when the needs or demands made on them increase.

Interview 47 – Other

No, people don't like being told what to do. It's a bit like Microsoft Project Manager: what suits big schools is probably too complicated for what many schools, especially smallish ones, will actually want.

Interview 46 – Commercial

Connectivity and access to resources is high on our list – to broker and buy in additional content (bulk procurement that goes through the editorial process) – brokering deals in terms of better pricing structures (if we negotiate for our schools, you reduce the cost by x% – where x% could be as high as 80%).

Interview 29 – LA

on providing network infrastructure (for example Preliminary interview 15 – LA). Some authorities developed lists of recommended suppliers but did not necessarily couple this with preferential deals. Some authorities concentrated on trying to help decision makers develop the competences and knowledge to make informed purchasing choices (for example Interview 31 – LA). Combinations of these strategies also occurred.

### **Strength of the evidence**

The tensions underlying these different approaches can be found in the history of ICT procurement in many countries<sup>150</sup>. While some countries have adopted common systems, others have relied on local choice. There is also substantial diversity of practice among our respondents – both on a cross-sectional basis and over time as LAs, schools and colleges change their views on the basis of experience. There was clear evidence of savings having been made through aggregated procurement strategies. However, there was also considerable evidence of waste through failure to capitalise on opportunities for economies of scale and/or scope (see p87 [panel 29](#)).

### **Areas for further research/development**

Procurement is a core aspect of Priority 6 in the e-strategy and Becta has put in place a range of frameworks and schemes in order to enhance effective procurement decisions<sup>151</sup>. However, further work is needed to explore how best to maximise on both economies of scale and economies of scope within a context in which individual organisations (schools and colleges) are likely to have greater control of their budgets, staff in schools and colleges often lack sufficient knowledge to make sensible decisions about ICT procurement, and there are potential advantages from regional and national level systems.

# Appendix 1

## The eSIR reference statement

### Aims

The over-arching aim of education, as envisaged in this eSIR reference statement, is the encouragement of 'smarter learners better able to cope with changing contexts'. This means that the focus of action should always be on enhancing learners' learning and that other changes (such as in how teachers teach, how education is organised or how funding is used) are being pursued, not in their own right, but as a means to make a positive impact on learners.

The importance of motivation is also noted in relation to both teachers and pupils in the e-strategy, which identifies for example how ICT has helped increase learners' motivation to learn<sup>152</sup>. The e-strategy also highlights the importance of lifelong learning, which is a frequently recurring theme in the document.

### The environment

The learning environment has two dimensions:

- the spatial environment – **where** learning takes place
- the temporal environment – **when** learning takes place.

The e-strategy explicitly states: 'We want to extend the variety of places where people can learn'<sup>153</sup> and it is clear that ICT is seen as enabling an expansion of the spatial learning environment. Indeed, the e-strategy goes further than this – stating: 'Every learner over 14 will have ... the opportunity to learn at home, in work, in college or in other community settings'<sup>154</sup> and talks about the potential of e-learning to 'blend more easily with life and work, bridging the boundaries between formal and informal learning'<sup>155</sup>. This eSIR reference statement therefore views the spatial learning environment as being anywhere the learner might be. Importantly the e-strategy explicitly states: 'ICT enables learning to be tailored to the needs of the pupil. They can learn where and when they want to, at a pace and in a style that best suits their needs. Learning shouldn't be confined to the classroom or school hours.'<sup>156</sup> The 'centre of learning' can also be anywhere (which implies that learning can be initiated anywhere and that there are multiple flows of information).

In this eSIR reference statement the spatial learning environment has three components which require

different degrees of blending ICT with other learning enablers and support:

- The core site (for example the school)
- Other physical sites that are accessible to the learner (such as the home, another educational institution, a community resource or a work setting)
- Virtual sites (which may be accessed from a core site or any of the other physical sites).

As we have already seen, there is an expectation in the e-strategy that ICT will enable an expansion of the temporal learning environment. As the spatial learning environment expands to include other physical and virtual sites, the temporal learning environment is also extended. In this eSIR reference statement, learning is not confined to time spent at the core site (during the school day, for instance) but is seen as potentially taking place at any time.

### The actors

The e-strategy assumes that teachers and other members of the education community are key actors. The e-strategy goes further – highlighting the importance of parents (which we take to include all guardians and other assigned carers for learners up to the age of 18), who are mentioned over 40 times. These references often emphasise the importance of enhancing parental involvement in the provision made for their children<sup>157</sup>.

Inevitably, with the expansion of the learning environment the range of actors involved in education also grows. This eSIR reference statement includes as key actors:

- everyone in the student's school/college (the core site)
- those in the local education community
- mentors who have a long-term role in supporting the learner
- para-professionals who work in a variety of roles supporting the learner, but who do not have the long-term responsibility that a mentor has
- individuals and organisations at regional and national level that are able to provide learning opportunities and support not possible at local level.

These might be viewed as:

1. The prime actor group, which may be a partnership including:
  - the student (appropriate to the level of maturity of the learner)
  - teachers (mentors) who have an assigned responsibility for the student
  - the student's parent, guardian and/or assigned carer (for learners up to the age of 18)
2. The subsidiary actor group:
  - people who are employed in educational or care roles
  - people who volunteer for educational involvement.

There is an assumption that there will be an increase in the involvement and availability of actors as we move from the constraints of a non-ICT world, where physical presence is required for interaction, to an ICT world, where interaction at a distance and virtually are increasingly possible. The increasing involvement role of other actors is inevitable as 'Online networks open education institutions to the wider world. They can turn the school or college into a community hub linking sports organisations, libraries, social services, industry and other schools and colleges. For the head, principal or vice-chancellor, these hubs are also an excellent way to reach reluctant learners. They can rethink the boundaries of their institutions.'<sup>158</sup>

The e-strategy explicitly identifies the need for smooth transitions between different learning contexts, including supporting learners who are operating contiguously in more than one institution<sup>159</sup>. This can only happen if there is effective sharing of information between environments. Collaboration underpins the e-strategy and is essential to its success, as evidenced by the emphasis on cross-sector working, integrated services, sharing of good practice and working with others, which permeates its six priorities. This eSIR reference statement therefore views collaboration as essential in order to provide the choices and support that are required. This collaboration needs to be between all the key actors, no matter where they are located. Effective collaboration will include:

- assessment by actors of what they can do effectively enough on their own

- assessment by actors of what they can offer to other actors who cannot effectively do what is required
- sufficient flexibility of educational institution organisation and management to enable actors to seek and offer support to each other both within and across organisational boundaries.

Collaboration should involve sharing practice, resources and expertise across and between actors (individuals and organisations) and across networks in order to enhance learners' learning.

The e-strategy emphasises 'online personalised support' and 'transforming how people learn': these both involve greater learner control over their own learning. Moreover, the notion of learner choice permeates the whole of the e-strategy (for example, 'you will have more choice about where, when and how you study, making it easier for you to create your own mix...' <sup>160</sup>). Therefore, in this eSIR reference statement the role of the learner includes taking progressively greater control over their own learning, commensurate with their ability to do so (having been taught to exercise what control they are capable of).

## The curriculum

It is clear that personalisation and choice are intended to encompass the curriculum (as well as the learning environment) and these are intended to increase as learners become older and thus better able to make appropriate choices: 'Learners in the 14–19 age group will increasingly be able to direct and manage aspects of their own learning. This will give them access to a broader curriculum, with greater choice and more vocational options.'<sup>161</sup>

The corollary of this is the need for an increase in the range of curriculum options open to learners. This eSIR reference statement sees the curriculum available to learners as having three parts:

- A compulsory curriculum, which is fully supported
- An entitlement curriculum which extends beyond the compulsory curriculum, with curriculum and learner support provided in some way, and which is made accessible to all students in the organisation
- An extra-entitlement curriculum, for which there is learner support and available time, and which allows learners to follow their individual interests and needs.

Given the focus on lifelong learning and the learner's ability to learn, skills such as critical thinking, collaboration, information handling, problem solving and communication should be important aspects of the compulsory curriculum. This accords with the importance that the e-strategy places on improving 'basic and higher level skills ... throughout life'<sup>162</sup> and the role that it identifies for ICT to play in this. 'Because ICT is an interactive medium, it is ideal for helping learners develop the skills they need for the knowledge-based economy.'<sup>163</sup>

The entitlement curriculum should provide learners with an opportunity to choose what they want to study from a broad range of alternatives. Learners should be supported in making their choices within the entitlement curriculum and in following them. Learners should be supported in choosing their own targets and in studying in the mode that they find most satisfactory.

For the extra-entitlement curriculum it is assumed that the student will bear much of the responsibility for exploring opportunities but that, once an appropriate choice is made, the other actors will help the student in finding support to pursue this choice.

## Support

The support provided, including teaching, should span both the compulsory and entitlement curricula – for all aspects of learning (within reasonable bounds) – across the three different components of the spatial environment (core site, other physical sites and virtual) and the temporal environment. For very young learners this support is likely to be face to face. As learners become more mature, they will expand the learning environments within which they are operating and the support they receive must include an online element integrated with face-to-face support.

The support, which must be for all aspects of the learner's needs, should include:

- teaching (for instance helping them to learn something specific)
- feedback, formative assessment and summative assessment
- all aspects of the mentoring role (what they need to do next, for example, and what the opportunities are)

- support in taking responsibility for the learner's own learning (appropriate to their level of maturity)
- tools and content
- the ability to personalise the support in ways of the learner's own choosing.

As part of its focus on personalisation, the e-strategy places a great emphasis on learner choice. It identifies the need to develop systems that 'improve personalised support and choice'<sup>164</sup> and Priority 2 focuses on providing 'integrated online personal support for children and learners'<sup>165</sup>. The e-strategy clearly sees ICT making it possible for 'learning to be tailored to the needs of the pupils. [So that] They can learn where and when they want to, at a pace and in a style that best suits their needs.'<sup>166</sup> An important element of support in this eSIR reference statement therefore involves giving learners a choice about when and how they are supported in order to meet their individual needs.

# Endnotes – in text references

- <sup>1</sup> [http://partners.becta.org.uk/index.php?section=sa&catcode=\\_sa\\_cs\\_cf\\_03](http://partners.becta.org.uk/index.php?section=sa&catcode=_sa_cs_cf_03)
- <sup>2</sup> DfES (2005a)
- <sup>3</sup> Adapted from DfES (2005a p17)
- <sup>4</sup> Taken from DfES (2005a p25)
- <sup>5</sup> Taken from DfES (2005a p30)
- <sup>6</sup> Adapted from DfES (2006)
- <sup>7</sup> DfES (2005a paragraph 174)
- <sup>8</sup> For example DfES (2005a p3; paragraphs 10, 44, 46, 72, 73, 146)
- <sup>9</sup> For example DfES (2005a p2; paragraph 16, 136)
- <sup>10</sup> For example DfES (2005a paragraphs 16, 138, 143)
- <sup>11</sup> DfES (2005a paragraph 68)
- <sup>12</sup> For example DfES (2005a paragraphs 137, 147, 163)
- <sup>13</sup> DfES (2005a paragraphs 116, 163)
- <sup>14</sup> DfES (2005a paragraph 136)
- <sup>15</sup> DfES (2005a paragraph 32)
- <sup>16</sup> For example DfES (2005a p2; p3; paragraphs 4, 5, 21, 31)
- <sup>17</sup> For example DfES (2005a paragraphs 4, 30, 99, 122)
- <sup>18</sup> DfES (2005a p11)
- <sup>19</sup> For example DfES (2005a p2; paragraphs 11, 93, 145)
- <sup>20</sup> DfES (2005a paragraph 145)
- <sup>21</sup> DfES (2005a paragraph 145)
- <sup>22</sup> DfES (2005a paragraphs 16, 85)
- <sup>23</sup> DfES (2005a paragraphs 4, 7, 136)
- <sup>24</sup> Maddux (1993); Wenglinsky (1998)
- <sup>25</sup> Becta (2004 p94)
- <sup>26</sup> Fullan and Stiegelbauer (1991)
- <sup>27</sup> Twining (2002a)
- <sup>28</sup> Scaife and Rogers (1996)
- <sup>29</sup> Harrison *et al* (2003); Somekh *et al* (2004)
- <sup>30</sup> Lesgold (2000); Underwood and Dillon (2004)
- <sup>31</sup> DfES (2005b; 2005c)
- <sup>32</sup> DfES (2005b p18; 2005c p18)
- <sup>33</sup> Kitchen *et al* (2006)
- <sup>34</sup> Becta (2006b)
- <sup>35</sup> Golden *et al* (2006)
- <sup>36</sup> Prior and Hall (2004)
- <sup>37</sup> Becta (2006b)
- <sup>38</sup> Becta (2005b)
- <sup>39</sup> Becta (2005b)
- <sup>40</sup> Thomas (1996)
- <sup>41</sup> <http://www.ntschoool.net/ns/template.php> (viewed 29 April 2006)
- <sup>42</sup> Bradley (2003)
- <sup>43</sup> For example Wilson (1997); Holmes, Polhemus and Jennings (2005)
- <sup>44</sup> Graves (2001)
- <sup>45</sup> Becta (2005a)
- <sup>46</sup> Becta (2006b)
- <sup>47</sup> Becta (2005d p7)
- <sup>48</sup> Becta (2005d p8)
- <sup>49</sup> Becta (2006b)
- <sup>50</sup> Becta (2005d p8)
- <sup>51</sup> Becta (2005b)
- <sup>52</sup> Becta (2006b)
- <sup>53</sup> Becta (2005d)
- <sup>54</sup> HM Government (2004)
- <sup>55</sup> DfES (2005a pp22–30)
- <sup>56</sup> For example DfES (2005a p17)
- <sup>57</sup> Becta (2005b)
- <sup>58</sup> Underwood *et al* (2005)
- <sup>59</sup> HM Treasury (2005 paragraph 6.56; 2006 paragraph 6.60)
- <sup>60</sup> Becta (2006a)
- <sup>61</sup> Becta (2006b)
- <sup>62</sup> Twining (2006)
- <sup>63</sup> Bouck *et al* (2006)
- <sup>64</sup> The Assistive Technology Forum (2005 p4)
- <sup>65</sup> Twining *et al* (2005)
- <sup>66</sup> Naismith *et al* (2004 p5)
- <sup>67</sup> Becta (2005b)

- <sup>68</sup> Becta (2005b)
- <sup>69</sup> Becta (2006b)
- <sup>70</sup> Becta (2006b)
- <sup>71</sup> Kitchen *et al* (2006)
- <sup>72</sup> Becta (2006b)
- <sup>73</sup> Naismith *et al* (2004)
- <sup>74</sup> Twining *et al* (2005)
- <sup>75</sup> For example Bonnett *et al* (1999); Claxton (2002); Commission of the European Communities (2001); Davies, Hayward and Lukman (2005); Dede (2000); Hargreaves, D (2004); Hawkins (2002); Pelgrum and Anderson (2001); Resnick (2002)
- <sup>76</sup> For example Davies, Hayward and Lukman (2005)
- <sup>77</sup> Paine (2003)
- <sup>78</sup> Hargreaves, A (1994)
- <sup>79</sup> Dede (2000)
- <sup>80</sup> Trend, Davis and Loveless (1999)
- <sup>81</sup> Becta (2006b)
- <sup>82</sup> Becta (2005b)
- <sup>83</sup> <http://www.qca.org.uk/7280.html>
- <sup>84</sup> For example [http://www.sqa.org.uk/sqa/sqa\\_nu\\_display.jsp?pContentID=5607&p\\_service=Content.show&](http://www.sqa.org.uk/sqa/sqa_nu_display.jsp?pContentID=5607&p_service=Content.show&)
- <sup>85</sup> For example <http://www.ccea.org.uk/movingimagearts>
- <sup>86</sup> Becta (2006b)
- <sup>87</sup> QCA (2005)
- <sup>88</sup> Schome (2005)
- <sup>89</sup> Garrison and Archer (2000); Ramsden (1988)
- <sup>90</sup> Garrison and Anderson (2002)
- <sup>91</sup> Twining and Richards (1999)
- <sup>92</sup> DfES (2005a p24)
- <sup>93</sup> For example Becta (2005e; 2006d)
- <sup>94</sup> Becta (2005b)
- <sup>95</sup> Becta (2005b)
- <sup>96</sup> [http://partners.becta.org.uk/index.php?section=sa&catcode=\\_sa\\_cs\\_cf\\_03](http://partners.becta.org.uk/index.php?section=sa&catcode=_sa_cs_cf_03)
- <sup>97</sup> Becta (2006c)
- <sup>98</sup> HM Treasury (2005 paragraph 6.56; 2006 paragraph 6.60)
- <sup>99</sup> Becta (2006a)
- <sup>100</sup> Watzlawick, Weakland and Fisch (1974); Twining (2002)
- <sup>101</sup> Cuban (1988)
- <sup>102</sup> Fullan and Stiegelbauer (1991); Fullan (1992)
- <sup>103</sup> Hargreaves, A (1994)
- <sup>104</sup> Cuban (1988)
- <sup>105</sup> Fullan and Stiegelbauer (1991)
- <sup>106</sup> Sung *et al* (2005)
- <sup>107</sup> Davies, Hayward and Lukman (2005)
- <sup>108</sup> For example Watkins (2005); Wells and Claxton (2002)
- <sup>109</sup> Olson (2000)
- <sup>110</sup> Davies, Hayward and Lukman (2005)
- <sup>111</sup> Becta (2005b p5)
- <sup>112</sup> Becta (2005b p6)
- <sup>113</sup> Pelgrum and Plomp (1991)
- <sup>114</sup> Heppell (1993)
- <sup>115</sup> Fullan and Stiegelbauer (1991)
- <sup>116</sup> Osborne (2003)
- <sup>117</sup> Mumtaz (2000)
- <sup>118</sup> For example Hadley and Sheingold (1993); Heywood and Norman (1998); Somekh (1989a; 1989b); Seaborne (1993)
- <sup>119</sup> For example Somekh (1989a; 1989b)
- <sup>120</sup> Adapted from Somekh (1989a p21)
- <sup>121</sup> Davies, Hayward and Lukman (2005)
- <sup>122</sup> Becta (2005a)
- <sup>123</sup> Rhodes and Cox (1990)
- <sup>124</sup> For example Chandra (1986); Rhodes and Cox (1990)
- <sup>125</sup> Chandra (1986)
- <sup>126</sup> Somekh (1989a)
- <sup>127</sup> Davies, Hayward and Lukman (2005)
- <sup>128</sup> For example Fullan (1992); Preedy and Wallace (1993); Rhodes (1989)



- <sup>129</sup> Brown and McIntyre (1982)
- <sup>130</sup> Bell (1993a)
- <sup>131</sup> Blumenfeld *et al* (1979); Plomp (1991)
- <sup>132</sup> Fullan and Stiegelbauer (1991); Hargreaves (1994)
- <sup>133</sup> Fullan and Stiegelbauer (1991)
- <sup>134</sup> Gillman (1989)
- <sup>135</sup> Hadley and Scheingold (1993)
- <sup>136</sup> Huberman (1973); Fullan (1992); Plomp *et al* (1990); Blumenfeld *et al* (1979); Pelgrum and Plomp (1991); Fullan and Stiegelbauer (1991); Cox, Rhodes and Hall (1988); Lieberman (1994); Bell (1993a, 1993b)
- <sup>137</sup> Moseley *et al* (1999); Hoffman (1996)
- <sup>138</sup> Ellis (1986); Olson and Eaton (1986)
- <sup>139</sup> Twining *et al* (2005)
- <sup>140</sup> For example Fullan (1986); Sheingold *et al* 1983; Chandra (1986) Ellis (1986); Hall and Rhodes (1986); Rhodes (1989); Plomp *et al* (1990); Pelgrum and Plomp (1991); Zammit (1992).
- <sup>141</sup> Twining and McCormick (1999)
- <sup>142</sup> For example Hoffman (1996); Ridgway and Passey (1995 p67); Somekh (1998); Topp *et al* (1996)
- <sup>143</sup> Rhodes (1989)
- <sup>144</sup> Lieberman (1995 p593)
- <sup>145</sup> Somekh (1998)
- <sup>146</sup> Larson *et al* (2002); Twining and McCormick (1999)
- <sup>147</sup> For example Fullan *et al* (1987); Brown and McIntyre (1982); Sheingold *et al* (1983); Chandra (1986); Gillman (1989); Somekh (1989a); Plomp *et al* (1990); Pelgrum and Plomp (1991); Hadley and Sheingold (1993)
- <sup>148</sup> Mintzberg (1987)
- <sup>149</sup> see <http://www.meD8.info/cpf/frameworks.htm> (viewed 20 May 2006)
- <sup>150</sup> Finch (2006)
- <sup>151</sup> For example see <http://industry.becta.org.uk/display.cfm?page=1623> (viewed 20 May 2006)
- <sup>152</sup> DfES (2005a paragraph 174)
- <sup>153</sup> DfES (2005a p2)
- <sup>154</sup> DfES (2005a paragraph 16)
- <sup>155</sup> DfES (2005a p3)
- <sup>156</sup> DfES (2005a paragraph 136)
- <sup>157</sup> For example DfES (2005a p3; paragraph 21; paragraph 31; p17; paragraph 55; paragraph 62)
- <sup>158</sup> DfES (2005a paragraph 32)
- <sup>159</sup> DfES (2005a paragraph 68)
- <sup>160</sup> DfES (2005a p11)
- <sup>161</sup> DfES (2005a paragraph 145)
- <sup>162</sup> DfES (2005a paragraph 16)
- <sup>163</sup> DfES (2005a paragraph 85)
- <sup>164</sup> DfES (2005a paragraph 4)
- <sup>165</sup> DfES (2005a paragraph 7)
- <sup>166</sup> DfES (2005a paragraph 136)

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